THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The strike of blast furnace workers in the Mahoning and Shenango Valleys came on June 1 according to promise, and as intimated in these columns last week it is practically confined to the merchant furnaces. Sixteen furnaces are banked and two others have taken this opportunity to make repairs. The daily capacity of the 18 furnaces is about 4,100 tons or 8 percent of the total pig iron production shown in the May statistics. Two merchant furnaces in the Mahoning Valley are still in operation. As yet the steel corporation furnaces in the Valleys are active, as is the Sharon Steel Co.s stack at South Sharon, Pa. The strike has not affected the Pittsburg district. The companies whose men have gone out have taken no steps in the matter and there will be no collective handling of the trouble. In a few cases a 10 percent increase has been offered but not accepted. The demand for 8-hour shifts cannot be met, since the supply of men is not more than adequate under the 12-hour regime. It is not unlikely that work will be resumed at some of the furnaces within a week at some advance. In the Buffalo district a 10 percent advance was given voluntarily last month and this may be the basis of adjustment in the Valleys. The United States Steel Corporation which has been receiving iron from more than half the idle furnaces will have its steel works output curtailed by so much, and the strike will have its effect also in shortening the raw material supply of other steel works, as well as of mills and foundries. The anthracite strike has had no serious effect on the iron industry as yet, though several Pennsylvania furnaces have had to bank from time to time because coke shipments were not sufficient. The pig iron sales of the week have included 125,000 tons of Bessemer to various "independent" steel companies, deliveries running from October 1 to April 1. For the most part $20 at furnace was paid, but for some of the iron $20.50 and as high as $21. The steel corporation is expected to buy 100,000 tons for delivery in the second quarter of 1903, but the negotiations will not be put through until the furnace strike is over. Some purchases of basic iron have been made, Virginia basic being sold at $21.15 delivered Pittsburg. The freight is $1.50. The Southern furnaces have little foundry iron to deliver this year, less, it would appear, than the foundries will want from that source. Inquiries for prompt iron are regularly coming in to the offices of sellers, and occasionally a foundry shuts down because of non-receipt of iron. Sales of Southern iron are made in a small way at $17 to $18 at furnace delivery in the last four months of the year. For 1903 delivery prices differ. Northern furnaces ask $20 and $21 at furnace for No. 2 foundry, delivered in the first quarter of the new year, or $1 to $1.50 less than the basis for 1902 delivery. In finished material the important development, as predicted in this column last week, is the fixing of the price of rails for 1903 at $28, the price of 1902, and the opening of the books of the manufacturers. A considerable tonnage is already booked that will be delivered after Jan. 1 and the prediction is already made that even with the Lackawanna mill in operation and the Tennessee Coal, Iron & Railroad Co.s tonnage there will be full employment in 1903 for the entire capacity. But there will be better ground for estimate when the crop conditions for this year, which are now the pivotal feature of the situation, are more clearly determined. Agricultural works have bought most of their finished material for the next 12 months and some of the leading companies have bought considerable pig iron for 1903. Railroad buying, judging from the freight situation in the iron trade, must continue to be heavy, for the car and locomotive supply is still far from sufficient.

PITTSBURG.

OFFICE OF *The Iron Trade Review*, 429 PARK BUILDING, June 4.

A strike of the blast furnace workers in the Mahoning and Shenango Valleys on Sunday, June 1, reducing the daily production of iron in these two important districts by 4,100 tons daily has further complicated the present iron and steel situation. In the two Valleys there are 33 furnaces and at the present time 16 furnaces, producing 1,275,000 tons of iron annually are banked on account of the strike. There are twelve furnaces in operation with a yearly capacity of 1,720,000 tons, and there are idle and undergoing repairs furnaces with an annual capacity of 440,000 tons. Prior to the strike the country was making iron at the rate of 18,400,000 tons a year, and the reduction because of the strike is very close to 1,500,000 tons or about 8 percent. The furnaces in operation in the Valleys include all those operated by the United States Steel Corporation, nine in number, one furnace of the Sharon Steel Co. and two merchant furnaces. Thus far the strike has not spread to the Pittsburg district and there is little indication that it will.

A number of the individual operators have already offered the men advances in wages amounting to 10 percent and it is altogether probable that the strike will be settled before the end of the week on this basis. The 8-hour demand is entirely out of the question, as the men are not available even should the operators concede it.

The week has also been an eventful one so far as heavy sales of Bessemer iron are concerned. Five independent steel producers purchased upwards of 125,000 tons of iron for delivery through the last quarter of this year and the first quarter of next year at prices ranging from $20 to $21 at the furnaces. The United States Steel Corporation is still negotiating for the purchase of about 100,000 tons of Bessemer for delivery through the second quarter of next year and the deal will probably be closed as soon as the present blast furnace difficulty is adjusted. The cutting off in production of 4,100 tons daily in the Valleys will result in still further deferred deliveries of all kinds of iron, and should the strike be at all prolonged pig iron prices will go still higher.

Owing to the heavy demand for basic and Bessemer iron from its steel plants the United States Steel Corporation has all its furnaces formerly operating on ferro-manganese on these irons. As a result a considerable production of ferro has been cut off and up to the present time fully 30,000 tons of English ferro-manganese have been contracted for, deliveries running up to July 1 next year. One sale made during the week calls for 3,000 tons of English ferro for delivery through the first half of next year. The German producers of manganese have been unable to meet the price of the English producers, which is $49 delivered at buyer's mill, Pittsburg. The best price that the German producers can name is $52.

Rail prices for next year's delivery have been fixed at $28 per ton and already a number of orders have been booked by some of the rail mills. Present indications point to a considerable tonnage running over into 1903, as was the case the first of this year, and with comparatively little new rail capacity coming in the heavy buying that is already promised may result in the placing of some rail orders abroad.

The amount of new business closed in wrought and seamless tubing during the week has been heavier than at any previous time in the history of the departments. The seamless department opened books for contracts expiring July 1, 1903, and the tonnage already booked is immense.

PIG IRON.—That there promises to be a continued scarcity of pig iron running not only through the first quarter of next year but the first half as well is indicated by the purchase of 125,000 tons of Bessemer by five large steel interests for deliveries extending through six months commencing October 1. In addition the United States Steel Corporation is continuing its negotiations for 100,000 tons for delivery through the second quarter of next year and the deal will probably be closed as soon as the present strike is settled. Other sales of Bessemer in small lots aggregating 15,000 tons for late delivery this year and the first three months of 1903 were made at $21 at the furnace. Inasmuch as the sales of all the Bessemer thus far for delivery through the first quarter of next year have been made at prices ranging from $20 to $21, there is little indication that the United States Steel Corporation will be able to purchase for the second quarter of 1903 much below $20 at the furnace. There is very little doing in foundry and forge irons, with prices ruling about the same as last week. A local steel producer purchased 5,000 tons of Virginia basic for delivery the last three months this year at $20.15, Pittsburg. We revise quotations as follows:

Bessemer, Valley	$20 00 to 21 50
Bessemer, Pittsburg	20 75 to 22 25
No. 1 Foundry	22 25 to 22 50
No. 2 Foundry	21 50 to 22 00
No. 3 Foundry	20 50 to 21 25
Gray Forge, Pittsburg	20 25 to 20 75
Chilled Basic, Valley	20 75 to 21 00
Chilled Basic, Pittsburg	21 50 to 21 75

STEEL.—Practically no domestic steel is being offered and on one small lot placed on the market this week a price of $36 was fixed. The buying of German steel continues and we note the sale of 5,000 tons for delivery in Pittsburg and Cleveland at prices ranging from $32.50 to $33 per ton. From present indications some contracts with German steel mills will have to be canceled, owing to the inability of the shippers to secure vessel room during June, July and August. Several have already been canceled for the reason that the deliveries could not be made within the time specified. All these conditions tend to further complicate matters for the steel manufacturer not having his own supply of steel and mills dependent upon the German producers entirely will be compelled to shut down during these months.

FERRO-MANGANESE.—There is practically no domestic manganese being offered on the market and the English producers have closed upwards of 30,000 tons for deliveries running up to July 1 next year. On all this ferro a price of $49 delivered was named, which is $3.50 below the nominal quotation for domestic ferro.

SPELTER.—The spelter market continues to climb and sales within the past few days have been made at 4.65 to 4.68c, delivered, Pittsburg.

MUCK BAR.—Muck bar is very scarce, while the demand is exceedingly heavy. Small sales have been made in the week at $36 per ton.

SKELP.—Within the past few days iron skelp has advanced to 2.40 to 2.50c and little is to be had at these prices. Grooved steel is quoted at 2.25c, while sheared steel has sold as high as 2.50c for a small lot for quick delivery.

RAILS AND TRACK MATERIAL.—It was decided by the steel rail manufacturers last week to continue the present price of standard section rails on deliveries through 1903. Already several large orders have been booked while the tonnage that will be carried into next year will be larger than that carried into the present year. Quotations are as follows: Standard sections, 50 pounds and over, in lots of 200 tons and over, $28; car lots and less than 200 tons, $30; less than car lots, $32; light rails, 8 pounds, $45; 12 pounds, $42; 16 pounds, $39; 20 pounds, $37; 25 to 40 pounds, $34 to $36. Track material: Spikes, 2c to 2.05c; track bolts, square heads, 2.50c; hexagon heads, 2.65c; fish plates, 1.60c.

PLATES.—A meeting of the plate manufacturers will be held on Thursday at New York and some of the smaller interests will demand that an advance be made. This will, no doubt, be prevented by the large interests, who believe in holding to the present quotations. Local plate mills are securing premiums on plates for early deliveries, while on certain gauges deliveries cannot be made for 60 days or more. We make the following quotations: Tank plates, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plates more than 100 inches wide, 5c extra 100 pounds. Plates 3-16 of an inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5 cents extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

BARS.—Owing to the difference between the quotations on iron and steel bars the amount of new business that is being placed is largely with the steel bar manufacturers. In the Eastern section of the country, however, the high prices on iron bars are being secured. Quotations are unchanged as follows: Bessemer steel bars, 1.60c; open-hearth, 1.70c; plow beams and cultivator beams, 1.60c, net; channels, angles, zees and tees, Bessemer under 3 inches, 1.70c; over 3 inches, 1.80c; bar iron, 1.70c to 1.80c, Pittsburg, with full freight added to point of delivery. Hoops and bands are quoted at 1.90c, full extras, in 250-ton lots and over, and 2c in less than 250-ton lots; refined iron bars, 2c and upwards.

PIPES AND TUBES.—During the past week the seamless department of the National Tube Co. closed a number of heavy contracts for tubing for delivery to July 1 next year. The tonnage placed in welded pipe was also very large, the week's business being probably the heaviest in the history of the company. We make the following discounts to jobbers in carload lots, Pittsburg:

MERCHANT PIPE.

	Black. Per cent.	Galv. Per cent
⅛ to ⅜ and 11 to 12 inches	60	48
¼ to 12 inches	67	55

Discounts to consumers in carload lots, Pittsburg, are revised as follows:

BOILER TUBES.

Steel.

	Per cent.
1 to 1¼ inches	42½
2¼ to 5 inches	61
1¾ to 2¼ and 6 to 13 inches	55½

Iron.

	Per cent.
1 to 1¼ inches	39
2¼ to 5 inches	48
1¾ to 2¼ and 6 to 13 inches	38

CASING.

	S. and S. Per cent.
2 to 3 inches	58
3¼ to 4 inches	60
4¼ to 12½ inches	63

SHEETS.—A scarcity of the heavier gauges continues although the American Sheet Steel Co. expects to place in operation a number of mills shortly designed exclusively for the heavier sizes. We make the following quotations: Nos. 10 and 12, 2.40c to 2.50c; 14 and 15, 2.50c to 2.60c; 16, 2.60c; 18 and 20, 2.70c to 2.80c; 22 and 24, 2.80c to 2.90c; 26, 2.90c to 3c; 27, 3c to 3.10c; 28, 3.10c to 3.20c; 29, 3.25c to 3.35c; 30, 3.35c to 3.45c. Galvanized sheets, in carload lots to consumers, are quoted at 3.05c for Nos. 10 and 11, 3.45c for Nos. 18 to 21, 4.20c for No. 27, and 4.50c for No. 28. Galvanized sheets, mill shipments in carload lots to consumers are as follows: Nos. 10 and 11, 3.05c; Nos. 12 to 14, 3.15c; Nos. 15 to 17, 3.25c; Nos. 18 to 21, 3.45c; Nos. 22 to 24, 3.75c; Nos. 25 and 26, 4c; No. 27, 4.25c; No. 28, 4.50c.

STRUCTURAL MATERIAL.—The two large structural interests are now taking orders for material for delivery next year and the tonnage already booked is extremely heavy. Small lots of material from stock are held at 3c, while larger lots from dealers are quoted at 2½c. Agreement quotations remain unchanged as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles from 3 to 6 inches, 1.60c; universal mill plates, 1.60c.

WIRE AND WIRE NAILS.—There is little demand and many of the mills are replenishing stocks for the fall trade. Prices

are as follows: Wire nails in carload lots, $2.05 per keg; smaller lots, $2.10 and $2.15; plain wire, $2 in carload lots and $2.10 in less than carload lots to retailers; galvanized wire $2.40 in carload lots, polished staples, $2.20, and galvanized staples, $2.60; panited barb wire, $2.60, and galvanized, $2.90. These prices are quoted on a Pittsburg base, plus the actual freight to destination. Cut nails are held at $2.05 in carload lots and $2.10 in less than carload lots, Pittsburg, plus freight to destination.

MERCHANT STEEL.—The Crucible Steel Co. of America is meeting with considerable success in pushing the sale of its steel in England and Germany. Sales made thus far have been very satisfactory and the introduction of this steel in these foreign markets is a marked victory for American made tool steel. We make the following quotations: Turned, cold rolled ground shafting in carload lots is quoted 50 off, and in less than carload lots, 45 off; tire steel, 1.80c in carload lots and 2c less than carload lots; toe calk, 2.10c to 2.25c; sleigh shoes, 2.10c to 2.25c; machinery steel, 1.70c; smooth machinery steel, 1.75c. Tool steel, 7 cents and upwards.

OLD MATERIAL.—The railroads are about to place heavy lots of old material on the market and it is pretty generally conceded that the market will be somewhat easier, at least for a brief time thereafter. We revise quotations, gross tons, as follows: Car wheels, $21 to $21.50; steel rails, mixed lengths, $21; cast scrap, $18.50 to $18.75; No. 1 wrought, $23 to $23.50; wrought turnings, $13.50 to $14; heavy melting stock, $21 to $21.50.

COKE.—The stocks of coke that accumulated in the Connellsville region during the past six months have now entirely disappeared and the railroads are moving the product as fast as it is produced. For the week ending Saturday, May 24, the Connellsville *Courier* estimated the production at 248,571 tons, an increase of several thousand tons over that of the previous week. Shipments for the week aggregated 12,054 cars. The production in the lower Connellsville region amounted to 34,667 tons. For future shipment furnace coke, strictly Connellsville, is held at $2.50 and foundry at $2.75 to $3. Outside cokes are quoted at about 25 cents below these prices.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
519 MONADNOCK BLOCK, June 3.

Gauged by the actual transactions during the past week, this market would be called extremely dull. Little iron of any kind has been sold, for the simple reason that there is little to sell, either for spot shipment or delivery during the balance of the year. Never before has iron been so hard to get or, generally speaking, have such high prices been asked for material, as is the case today. Practically all the finishing mills are sold up for periods varying from six months to a year, and with the exception of a little local iron for delivery in the last quarter, pig iron cannot be had for love or money. The market is one of unprecedented strength, and notwithstanding the high prices at present prevailing, many sellers expect them to go still higher before the year is ended. The crucial time will come as soon as the crop conditions for the year are learned. Should the report be optimistic, manufacturers believe an immediate impetus both in prices and demand will be felt, and vice versa. One large seller of bars looks for iron to advance to two cents and steel proportionately within a few weeks, although the price of the former material has barely been maintained of late. The advancing costs of raw material, it is stated, will soon compel a readjustment in the prices of the finished product. There is a heavy demand for foreign billets, and one seller reports inquiries aggregating 50,000 tons. The local rail manufacturer has opened its books for business for 1903, and some of the contracts which have been pending several weeks have been closed. Bolts and nuts have advanced 15 cents per 100 pounds, and spikes, 10 cents. Cast iron pipe has also advanced $3 a ton.

PIG IRON.—Both buyers and sellers are all of the opinion that the present situation has problems enough of its own without guessing as to what the future has in store. And the future for the foundryman has not a very bright outlook. The local market is in an anomalous condition. The Birmingham basis for No. 2 foundry has been fixed at $16, yet nothing can be purchased at this price; and rather than sell at this figure, those furnaces that have any unsold iron for delivery this year have withdrawn from the market. Most furnaces are willing to do the best they can for their regular customers, but consistently pass up all others; and it is not at all uncommon to learn of foundrymen rushing from one office to another with orders which they are only too willing to place, whatever the price the seller may ask. In actual transactions, the market has been quieter than usual in the past week, though it has gained in strength. Some Northern iron is still being offered for delivery in the last quarter and it is being rapidly taken up. Many malleable contracts which were made for the first half will soon be expiring, but the melters do not appear over anxious to buy for the second half, judging from the number that have already closed for this period. One seller states that fully one-half of the malleable consumers have yet to cover for the last six months of the year. There has been a good demand for Lake Superior charcoal in the last two weeks, the price of which we have advanced in this issue. We have also revised our quotations of Southern iron, as little or none is being sold on the $16 basis. Our quotations follow:

Lake Sup. Charcoal	$23 50 to $24 00	Southern Coke No. 4	$19 65 to $20 15
Local Coke Fdy. No. 1	22 00 to 22 50	Southern No. 1 Soft	21 15 to 21 65
Local Coke Fdy. No 2	21 00 to 21 50	Southern No. 2 Soft	20 15 to 20 65
Local Coke Fdy. No. 3	20 00 to 20 50	Southern Gray Forge	19 65 to 20 15
Local Scotch Fdy. No. 1	21 00 to 21 50	Southern Silveries	21 15 to 21 65
Local Scotch Fdy. No. 2	20 50 to 21 00	Jackson Co. Silveries	23 50 to 24 50
Southern Coke No. 1	21 15 to 21 65	Ohio Strong Softeners	24 10 to 24 60
Southern Coke No. 2	20 65 to 21 65	Alabama Car Wheel	23 65 to 24 10
Southern Coke No. 3	20 15 to 20 65	Malleable Bessemer	22 00 to 22 55

BARS.—There has been a fair business in the past week, though the orders are generally for small lots. Though the price of 1.95c has barely been maintained in the last few weeks, being shaded by all when desirable business was offered, one large seller stated that it was quite possible, owing to the excessive cost of raw materials, that bar iron would advance to 2c in the near future, and steel proportionately. We quote Chicago delivery: Bessemer steel, 1.75c to 1.85c; angles, less than 3x3, 1.85c; iron, 1.85c to 1.95c; hoops, 2.15c. Prices out of store, steel, 2c to 2.10c; iron, 2.15c to 2.25c; hoops, 2.40c to 2.45c; angles, 2.50c to 2.60c.

SHEETS.—On gauges 10 to 18 there is a brisk demand, which mills are not fully able to meet. On other sizes the market is fairly active, both in black and galvanized sheets. We quote No. 27 black, mill shipments, Chicago delivery, 3.15c to 3.25c; galvanized, 4.40c to 4.50c; out of store, No. 27 black, 3.45c to 3.55c; galvanized, 4.70c to 4.80c.

STRUCTURAL MATERIAL.—Buying for next year's delivery is not very active in this market, though the demand from stock is brisk. We quote mill prices as follows: Beams, 15 inches and under, 1.75c; 18 inches and over, 1.85c; structural angles, 3x3 to 6x6, 1.85c; angles, channels and tees, smaller than 3 inches, 1.85c base; plates, 1.75c. Prices on lots from store are based on the necessities of buyers and according to the size of order. Mills are sold up for the entire year, and consumers in immediate need of material must go to jobbers for the same or buy abroad. Store prices vary from 2½ to 4 cents a pound.

BILLETS.—One seller of foreign material has received inquiries for open-hearth billets aggregating 50,000 tons, which he is endeavoring to place abroad. Billets of domestic manufacture are very scarce, it being difficult to purchase for any delivery. We quote domestic Bessemer billets, $36 to $38; open-hearth, $38 to $40.

RAILS AND TRACK SUPPLIES.—The local interest has opened its books for the delivery of standard section rails for next year at $28, and some good sized contracts have already been closed. The demand for light rails is also active, though manufacturers are sold up as far as October. An advance of 15 cents per 100 pounds has been made in bolts and nuts, and 10 cents in spikes. We quote standard sections, $28; second quality, $27; light rails, 45 pounds, $33; 12 pounds, $40 with regular differentials for intermediate sizes; out of store $45 to $50; splice bars, 2c; spikes, carload lots, 2.45c to 2.55c; track bolts 3½x3¼, with square nuts, 2.85c per 100 pounds; with hexagon nuts, $3, with usual differentials for other sizes.

MERCHANT STEEL.—One large manufacturer reports that shipments into this field during the month of April were the largest in tonnage of any month in the company's history. Current demand is not heavy, which is due to the fact that mills are not seeking new business. We quote mill shipments,

Chicago delivery, as follows: Smooth finished tire steel, 1.95c to 2c; open-hearth spring steel, 2.65c to 2.75c; sleigh shoe, 1.75c to 1.80c, flat sizes; concave and convex, 2c; out of store, 2.15c; cutter shoe, 2.40c to 2.60c; machinery steel, 2.15c to 2.25c, base; plow steel, 2.50c and upwards, according to quality; toe calk, 2.25c to 2.35c; out of stock, 3c to 3.10c; ordinary tool steel, 6c to 7c; specials, 13c and upwards; less than carload lots, 5 percent to 10 percent higher; cold rolled shafting, carload lots, 50 percent off, Chicago; less than carload lots, 45 percent off, Chicago.

CAST IRON PIPE.—This material has advanced about $3 a ton in all sizes in the last week. New business is of good proportions, though no large contracts are reported. We quote 4-inch water pipe, $34, carload lots, f. o. b. Chicago; 6-inch water pipe and large sizes, $32; gas pipe $1 a ton higher than these prices.

MERCHANT PIPE.—Demand continues in the even tenor of its way, the tonnage closed being nothing unusual for this time of the year. We quote as follows:

MERCHANT PIPE, RANDOM LENGTHS.

	Black Per cent.	Galv. Per cent.
⅛ to ⅜ in.	56½	44½
¼ to 12 in.	63½	51½

BOILER TUBES.

Steel.

	Per cent.
to 1½ in.	35
1¾ to 2½ in.	45
1¾ to 5 in.	55
6 to 13 in.	47½

Iron.

	Per cent
1½ in.	35
1¾ to 2¼ in.	32½
2½ in.	35
2¾ to 5 in.	42½

PLATES.—Mills are still refusing to take new business, and current orders are deflected to jobbers. The demand is quite active. We quote mill prices, Chicago delivery: Tank steel, ¼-inch and heavier, 1.75c to 2.15c; flange steel, ¼-inch and heavier, 1.85c to 2.25c; from stock, tank steel, ¼-inch and heavier, 2c to 2.35c; 3-16, 2.10c to 2.45c; No. 8, 2.20c to 2.55c; flange steel, 2.35c to 2.50c.

WIRE AND WIRE NAILS.—There is a brisk demand for all kinds of wire products, and the local interest reports all its mills working to their fullest capacity in keeping up with orders. We quote as follows: Smooth wire, carloads, $2.15; painted barb wire, $2.75; galvanized barb wire in carload lots, $3.05; wire nails, carload lots, $2.20; staples, carload lots, $2.30; jobbers' prices to retailers, 10 cents higher than above for carload lots, and 20 cents higher for less than carload lots.

COKE.—The supply continues ample for all present needs. The scare resulting from the anthracite strike has caused many consumers to buy a little earlier and a little heavier than usual, and the week has been quite active. We quote standard 72-hour Connellsville foundry, $5.25 to $5.50; Virginia and West Virginia coke, $5 to $5.25.

OLD MATERIAL.—Buying of scrap has been very light and the market is somewhat weaker in consequence. Cast scrap and old wheels, in view of the scarcity of pig iron, are in active demand, and prices for these materials are maintained firmly. We quote gross tons as follows:

Old iron rails	$24 00 to $25 00	Old steel rails, mixed	$16 00 to $ 6 50
Old steel rails, 5 ft. and up	22 00 to 23 00	Relaying rails	27 00 to 28 00
Old steel rails, 3 ft. and under	17 00 to 18 00	Old wheels	19 50 to 20 00
		Heavy melting steel	15 50 to 16 00
		Mixed country steel	13 00 to 14 00

The following are selling prices per net ton:

No. 1 R. R. wrought	$19 50 to $20 00	Steel axles	$19 00 to $19 50
No. 2 R. R. wrought	18 00 to 18 50	Cast borings	9 50 to 10 00
Dealers' forge	15 50 to 16 00	Wrought turnings	13 00 to 13 50
No. 1 busheling	13 50 to 14 00	Iron axle turnings	14 00 to 14 50
No. 1 R. R. & mch. cast	14 25 to 14 75	Steel axle turnings	13 50 to 14 00
Railway Malleable	15 00 to 15 50	Stove plates	11 00 to 11 50
Country malleable	13 00 to 14 00	Old iron splice bars	21 00 to 21 50
Iron axles	24 50 to 25 00		

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, June 4.

Returns from the upper lake ore docks for May shipments of ore are not entirely complete, but it is evident from those received that the estimates based on the April rate of shipments were quite too high. It was thought that an April record of 1,854,902 tons pointed to May shipments close upon 4,000,000 tons, but the total, it is now certain, will fall far short of this. The car shortage and the consequent delays at Lake Erie docks in May were an unexpected complication. The anthracite strike might be expected to bring more cars to the lake ore trade, but little is to be expected from this source as soft coal must now be sent East, and the long haul required will keep the supply of coal cars quite well occupied. Some little betterment is noticed at Lake Erie docks this week, but there is no guarantee of its continuance. If the May troubles are duplicated in mid-summer experience it is not likely that any such increase over 1901 ore shipments will be scored as has been predicted in some quarters.

PIG IRON.—The blast furnace workers' strike in the Mahoning and Shenango Valleys is naturally an over-shadowing influence in the local pig iron market. Three stacks—Mabel, Atlantic and Mary—were out for repairs when the strike came, and two others—Claire and one Hubbard—have gone out for repairs in view of the strike, though otherwise they would not have been stopped for this purpose at the present time. The reduction of output is largely in Bessemer iron, with foundry iron, basic and forge together representing a less amount. Sales of iron have not been important in this market in the week. Foundries in a number of instances have failed to get iron according to schedule and inquiries for spot iron are a steady feature. Some foundries have had their output limited by short pig iron supply, and there are occasional shutdowns. Virginia furnaces have more iron to sell for 1902 than those of any other district, but the tonnage that can be had anywhere for delivery before September is exceedingly small. Occasional small lots of Northern iron are sold for delivery this year at $21 at Valley furnace. Central Ohio furnaces ask $21.50 at furnace and Southern Ohio furnaces $22 and $22.50. Some iron has been sold for next year's delivery on the basis of $20 at Valley furnace for No. 2. In other cases 50 cents to $1 higher is asked for early 1903 iron. For Southern iron, to be shipped in 1902, $17 to $18 is paid on the scattered business that comes up from week to week. There has been a considerable sale of Bessemer iron the past week, deliveries running from October to April at prices ranging from $20 to $21 at Valley furnace. We quote as follows the Cleveland market:

Bessemer	$20 50 to $21 50	Scotch No. 1	$21 75 to $22 75
No. 1 Strong F'dry	21 75 to 22 75	Scotch No. 2	21 00 to 22 00
No. 2 Strong F'dry	21 00 to 22 00	Gray forge, Valley	19 00 to 19 50
No. 3 Foundry	19 75 to 20 25	LakeSuperior char'l	22 00 to 23 00

FINISHED MATERIAL.—It is understood that some foreign steel has been sold for Cleveland district delivery, to help make good the shortage at sheet mills. In the past week there has been rather more activity in black and galvanized sheets, at unchanged prices. The supply of heavy sheets is slightly better. Cleveland prices are unchanged as follows: On mill sales of black sheets—No. 24, 2.90c to 3c; No. 26, 3c to 3.10; No. 27, 3.10c to 3.20c; and the following prices out of stock: No. 10, 2.35c to 2.50c; No. 12, 2.45c to 2.60c; No. 14, 2.55c to 2.70c; No. 16, 2.95c to 3.10c; No. 18, 3c to 3.15c; No. 20, 3.05c to 3.20c; Nos. 22-24, 3.15c to 3.30c; Nos. 22-26, 3.25c to 3.40c; No. 27, 3.35c to 3.50c; No. 28, 3.45c to 3.60c, for one pass cold rolled. For full cold rolled .10c extra is charged. On galvanized sheets Cleveland prices to consumers are as follows for carload lots: Nos. 10 and 11, 3.15c; Nos. 12 to 14, 3.25c; Nos. 18 to 21, 3.55c; Nos. 22 to 24, 3.85c; No. 27, 4.35c; No. 28, 4.60c. The bar trade is active and several good lots of steel bars have been sold the past week. One company that is in position to make fairly prompt deliveries is asking 1.80c Pittsburg for prompt steel bars, but on forward contracts 1.60c Pittsburg for Bessemer and 1.70c for open-hearth steel can be done. On bar iron August deliveries can be had from the mills, though on some contracts already in hand deliveries run to July 1, next year. The larger sizes of bars are rather scarce—2-inch rounds and over and 4-inch flats and over. On the small sizes that are produced on continuous mills the supply is better. Inquiries for plates show a steady consumption, but the mills that are not so thoroughly filled up as others want a better price than 1.60c Pittsburg. Premiums of $2 to $4 are secured where deliveries are promised within one or two months.

OLD MATERIAL.—There has been some buying of cast scrap in the past week and at somewhat higher prices. The mills are not buying heavily and in their lines of scrap there is more

hand-to-mouth trading than usual. The supply of scrap is greater than in the early spring months, present prices bringing it out. We quote the Cleveland market, all in gross tons:

Old iron rails	$ 24 00 to 26 00
Old steel rails (6 ft. and over)	21 00 to 23 00
Old steel rails (6 ft. and under)	18 50 to 19 50
Old car wheels	18 50 to 19 50
No. 1 R. R. wrought scrap	21 00 to 22 00
Mill scrap	18 00 to 19 00
No. 1 machine cast scrap	17 50 to 18 50
Iron axles	26 00 to 28 00
Axle turnings	16 00 to 17 00
Wrought turnings (free from cast)	13 50 to 14 00
Cast borings	9 50 to 10 00
Uncut wrought iron boilers	11 00 to 12 00
Steel boiler plates	16 00 to 17 00
Grate bars	11 50 to 12 50
Pipes and flues (clean)	17 00 to 18 00
Tank iron	17 00 to 18 00
Hoop and band iron	13 00 to 14 00
Sheet iron	11 00 to 12 00
Wrought drillings	13 00 to 13 50
Malleable iron	17 00 to 18 00
Stove plate	13 00 to 14 50
Heavy steel	18 00 to 19 00

CINCINNATI.

June 4.

Labor troubles appear to have had their effect on the iron trade in various ways. In some of the Northern districts strikes have interfered with the operation of furnaces; in the South furnaces have had no trouble. In this section the possibility of further trouble in the coal regions has led the railroads to husband their cars and to concentrate their coal cars so as to take advantage of any opportunity to get them filled with coal for their own uses. This will have some effect if it is kept up. On the other hand the labor troubles appeared to have stimulated some branches to increased energy, notably the handlers of structural material and finished material of various kinds. Builders and consumers of these kinds have been hurrying deliveries as much as possible.

In general the trade continues very good and the demand for everything is excellent. Machine tool men say that all that have not made some slight advance in prices during the past few months will be compelled to do so while those that have advanced prices somewhat will be compelled to do so a little more so that the general advance in machine tools will average 10 percent.

Pig Iron.—The pig iron situation has been somewhat disturbed by the labor troubles and another thing that has had its effect is that the Southern producers who recently entered the market after remaining out for a considerable length of time have again retired from the market. As for labor disturbances, nothing serious is expected. There was a little interest as to what would happen at some of the Ohio and Western Pennsylvania furnaces this morning, but information from a number at which trouble was feared is that they are still running. As for the Southern furnaces there is no organization among them and there is no unfavorable situation anticipated.

Sales of iron have been mainly in small lots, there being reported transactions of several thousand tons per day in the aggregate. It was reported here that 50,000 tons of basic had sold at Pittsburg at $19.15. This could not be authenticated here this evening. There has been a moderate demand for iron along the whole list, prices at which it has sold being mainly about as they were last week with slight advances. The three large Southern producers are practically retired until Sept. 1, and it is understood that some of the furnaces will have little iron to offer even then for delivery this year. Orders for 1903 will not be booked until about Sept. 1, according to the general agreement that is understood to have been entered into. Prices are a little stiffer and the following are given as Cincinnati quotations:

Southern Fdy. No. 1	$20 25 to 21 25	Gray Forge	$18 75 to 19 75
" " 2	19 75 to 20 75	Northern Fdy. No. 1	23 60 to 24 10
" " 3	19 25 to 20 25	" " 2	23 10 to 23 60
" " 4	18 75 to 19 75	Southern C. W. iron	24 75 to 25 25
So. Fdy. No. 1 soft	20 25 to 21 25	Malleable coke iron	22 50 to 23 00
So. Fdy. No. 2 soft	19 75 to 20 75		

Finished Material.—The market has been uneventful as far as finished material is concerned. The demand has kept up to its previous point of unusual activity and prices have been maintained at their former stiff quotations. Building operations in and about Cincinnati have been heavy and the demand for structural material has been increasing instead of diminishing. The construction of interurban and other electric lines has given a big demand for rails and deliveries are being made on contracts made about a year ago. New contracts are being made for delivery about as far hence. All lines demanding bars, sheets and plates are making anxious inquiry as to future deliveries. Bar iron remains at 1.92c and bar steel at 1.72c, both iron and steel bars being quoted at 2.20c out of store. Angles are 2.35c and 2.50c out of store. Sheets are quoted at 2.50c for No. 12 and 2.35c for No. 10.

Old Material.—There is nothing about the scrap market to distinguish it from the situation that has been reported for the past few weeks. It is strong, and the supply of material is by no means good. In spite of this the prices of rails, axles, machine scrap and other grades hold about steady. Prices at Cincinnati are as follows:

Old No 1. Wrought Railroad, net tons	$ 19 50 to 20 00
Cast Machine and Foundry, net tons	14 00 to 14 25
Old Iron Rails, gross tons	25 00
Old Steel Rails, gross tons	24 50 to 24 75
Old Short Lengths, gross tons	17 50 to 18 00
Old Iron Axles, gross tons	35 00
Old Iron Car Wheels, gross tons	19 00 to 19 50
Stove Plates, gross tons	11 00 to 11 25
Wrought Turnings, net tons	14 00
Cast Borings, net tons	8 50 to 8 75

PHILADELPHIA.

June 3.

The curtailing of production through many causes, involving labor questions and the fuel supply, prolongs the unsettled condition of affairs and further complicates the situation. Through inadequate supplies of material nearly every branch of industry is more or less affected and manufacturers are unable to guarantee deliveries at stated periods, which in turn discourages the placing of new orders. More business is being placed abroad and the foreign markets are temporarily receiving more attention than domestic producers. The home trade is principally confined to transactions where deliveries can be made within a relatively short time.

Pig Iron.—The cutting down of production is taken by some to mean that prices will reach a higher level while others hold the view that such a course will result in the abandonment of projected enterprises until normal conditions shall prevail. Considerable quantities of foreign iron are being delivered along the Atlantic seaboard, where favorable freight rates are the rule. For June and July deliveries from $21 to $22 is the best that can be done in No. 2 X foundry, with but few tranbest that can be done in No. 2 X foundry, with but few transactions at the inside figure. For the last quarter of the year a are willing to offer consumers during that period. For Philadelphia and near-by points quotations remain about as follows: No. 1 X foundry, $21 to $22; No. 2 X foundry, $20 to $20.50; No. 2 plain, $19.50 to $20; standard gray forge, $18.75 to $19.50; ordinary gray forge, $18.25 to $18.50; basic, $19.25 to $19.75.

Finished Material.—There is nothing new to be said in regard to structural material, the scarcity of which is exasperating. Importations are relieving some of the most pressing needs, foreign angles bringing from 2.40c to 2.60c. The bar mills find it difficult to make satisfactory deliveries, and if the fuel supply is not interfered with the plate mills will show some new records for their output through the balance of the year. The range of prices for city and near-by deliveries is about as follows: Plates ¼-inch and thicker, 2c to 2.10c; steel bars, 1.85c to 1.95c; iron bars 2c to 2.05c; beams and channels, 1.90c to 2.10c; angles, 2c to 2.50c.

Old Material.—The market lacks uniformity, and the partial suspension at some mills has tended to discourage shipments. Cast iron scrap and heavy melting steel continue to command full prices. Bids and offers are about as follows for deliveries buyers' yards: Choice railroad scrap, $23 to $24; ordinary light scrap, $16 to $17; machinery cast, $18 to $18.50; heavy steel scrap, $21 to $22; old iron rails, $25 to $26; wrought turnings, $16 to $17; cast borings, $10 to $10.50; old iron axles, $27 to $29; old steel axles, $26 to $27; old car wheels, $19.50 to $20.50.

The Amalgamated Association is in constant receipt of letters asking for skilled workmen. President Shaffer is authority for the statement that in his mail Tuesday morning he had calls for more men than the organization can trace in the whole country. At least 50 sheet mill men could be placed at once and there is a large demand for puddlers.

The Youngstown Steel Casting Co., of Youngstown, O., expects to start its new plant by July 15.

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JUNE 5, 1902.

BOSTON CONVENTION OF THE AMERICAN FOUNDRYMEN'S ASSOCIATION.

The secretary, Dr. Richard Moldenke, announces the provisional program for the Boston convention of the association, to be held Tuesday, Wednesday and Thursday, June 17-19. The headquarters will be at the Hotel Brunswick and the business sessions in the assembly hall of the Massachusetts Institute of Technology. The elaborate program of entertainment and the unusual list of papers on subjects of practical value are naturally attracting much interest and the committee is already assured of a large attendance. The program follows:

TUESDAY, JUNE 17.

Morning session, 10 o'clock.—Addresses of welcome and response.

Secretary's report.

Treasurer's report and auditor's report.

Report of Committee on the Standardizing Bureau.

Report of Committee on Standard Methods of Determining the Constituents of Cast Iron.

Report of the Committee of Standard Sampling of Pig Iron.

Report of the Committee on the Grading of Pig Iron by Analysis.

Report of the Commttee on a Foundry Trade School.

Presentation of the Standard Specifications for Steel Castings as adopted by the American section of the International Association for Testing Materials.

Presentation of a memorial on the insuring of patterns, by Frederick Conlin, of South Bethlehem, Pa.

Presentation of a memorial on the proper valuation of pig iron for foundry purposes, by Dr. Richard Moldenke, New York.

Afternoon.—This day being a holiday in Boston, an invitation by the city to witness the military and civic parade has been extended. Arrangements have been made also to attend the ball game of that day for those who prefer it. In case of rain, a business session will be held.

Evening.—Theater party.

WEDNESDAY, JUNE 18.

Morning.—From 9-10 o'clock an opportunity will be given members, through the courtesy of the authorities of the Massachusetts Institute of Technology, to study their very complete engineering laboratory, where tests on various materials will be in progress at the time. Business session begins at 10 a. m.

"Some Methods of Increasing Foundry Production," by David Reid, Biddeford, Me.

"Shop Conditions," by Hugh McPhee, Bridgeport, Conn.

"Foundry Costs," by R. P. Cunningham, Holyoke, Mass.

"Cores and Core Arbors," by Edw. B. Gilmour, Milwaukee, Wis.

"Shop Tools and Rigs," by Jas. A. Murphy, Erie, Pa.

"Technical Education," by Prof. R. H. Richards, Boston, Mass.

"The Molding Machine—Jigs," by S. H. Stupakoff, Pittsburg, Pa.

"The Effect of Melting Steel with Iron in the Cupola," by H. E. Diller, Chicago.

A lecture by Dr. Fay, on the preparation of metallographic specimens for the foundry.

Afternoon.—Carriage drive through the Metropolitan Park system, visiting the plant of the Walker & Pratt Mfg. Co., Watertown, where lunch will be served, after which drives will be continued through Cambridge and Harvard College grounds back to hotel.

Evening.—Vaudeville and smoker. Special entertainment for the ladies.

THURSDAY, JUNE 19.

Morning and Afternoon.—Boat trip around Boston harbor with dinner at Nantasket Beach and a visit to the plant of the Fore River Ship & Engine Co., if arrangements can be made to get there by boat.

Evening.—Business session. Ladies will be specially entertained.

"The Metallurgy of the Cupola," by Herbert E. Field, Ansonia, Conn.

"Economy," by P. R. Ramp, Schenectady, N. Y.

"Foundry Accounting," by James G. Stewart, North Ormesby, Eng.

"The Molding Machine—Flasks," by S. H. Stupakoff, Pittsburg, Pa.

"Brass Melting," by Chas. Vickers, Chicago.

"Cast Iron," by Percy Longmuir, Manchester, Eng.

A lecture by Albert Sauveur, on the application of metallography in foundry work, illustrated by projections from the actual specimens of cast iron.

Unfinished business.

New business.

Election of officers.

Adjournment.

The Blast Furnace and Puddling Strikes.

(Special Telegram.)

PITTSBURG, June 4.—The blast furnace situation in the Mahoning and Shenango Valleys remains practically unchanged. The operators have not succeeded in placing any additional furnaces in operation, although attempts will be made with new men within a few days. The Blast Furnace Workers' Association has taken the stand that a settlement should be made through the organization, but from present indications this will not be done. The operators are pretty generally convinced that an offer for an advance in wages will bring the men back to work, and before the end of the week it is probable that the men will be offered 10 percent increase and should they desire to return to work they will have to apply as individuals.

The puddlers' strike in the Central and Eastern portion of this State remains practically unchanged. An unsuccessful attempt was made to operate some of the plants of the American Iron & Steel Mfg. Co. this week. The West End Rolling Mill Co. and Chain Works, Lebanon, Pa., this week granted the puddlers the rate of $4.50 and the plant is in operation again. Many of the men are leaving the Lebanon and Reading districts for Pittsburg and vicinity, where there is a great demand for puddlers, and the strike situation is very critical for this reason.

A meeting was held Monday night of shop committees from most of the Pittsburg machine shops to discuss means for securing higher wages. The meeting adopted a resolution that at the regular meeting of the district council Wednesday night of this week a demand be formulated asking for a general advance of 10 percent in wages. At the Pennsylvania Engineering Co.'s plant at New Castle, Pa., the men went on strike this week for an advance of 10 percent, having rejected an offer of 5 percent increase to take effect six months from June 1. They haxe expressed a willingness, however, to take 5 percent now and 5 percent in six months. At the Beaver Falls and New Brighton shops there is a demand for a reduction in the hours to nine, with the same pay, and the men assert they will strike June 10 if the demand is not granted.

CHANGES IN ROLLING MILL SCALES.

(Special Telegram.)

PITTSBURG, June 4.—At the conference held last week between representatives of the Republic Iron & Steel Co. and the Amalgamated Association at Columbus, O., the footnotes for the scale for the year 1902-3 were decided upon and adopted. The Amalgamated Association was granted a number of concessions, the most important of which provides for 8-hour turns on finishing mills working three turns. The changes in the footnotes adopted are as follows:

In clause 2 of the memorandum of agreement the limit was reduced from 160 pounds to 150 pounds.

Clause 5 was changed to read as follows: "On finishing mills working 3 turns, 8 hours shall constitute a day's work. Rolling shall not start earlier than 5 a. m. Monday and a week's work shall finish after the first 8-hour shift on Saturday. On all mills working three turns a third roller should be employed." Heretofore the charging time amounted to 9¼ hours and it was usually 12 hours before the turn finished its work.

A sixth clause was added which reads as follows: "On all 10-inch guide and hoop mills with one furnace averaging $35 per turn or more, or with two furnaces averaging $65 per turn or more on a 9¼-hour system, based on a 1-cent rate card, the 8-hour system should be adopted. On bar and 12-inch mills averaging 60,000 pounds on one furnace and 90,000 pounds on two furnaces per turn on the 9¼-hour system the 8-hour system should be adopted."

The changes in the boiling scale follow:

There was added to footnote 19 the words: "or with less than 50 percent of pig metal, 50 cents extra shall be paid." This is a concession to the men.

Footnote 24 was changed to read: "that puddlers when boiling metal shall only lose the amount over the limit of the ball." Heretofore the men lost the entire ball when the weight exceeded 10 pounds over the limit provided.

New clause 26 follows: "That where pipe is worked in cinder bottom furnaces mixed with light scrap it shall be cut 4 to 6 inches long for charging." This is another concession to the men.

New note 31: "That on all mills where screenings from the squeezers and rolls are given to puddlers, when working swarth, the full boiling price be paid and that such screenings cannot be classed as mixed material." Heretofore the puddlers received only half price for screenings.

In the muck or puddle mill scale clause 5 was changed to read: "On mills averaging 16 tons or less per turn in two weeks the company shall pay the drag-outs."

In the busheling and sand bottom scale the following was added to clause 6: "Total bundles not to exceed 80 pounds to each bundle." New clauses 7 and 8: "That when light scrap is worked without turnings 20 cents extra above the light scrap price shall be paid. That when heavy scrap is worked alone on sand bottom without turnings, the price to be 20 cents above the price for busheling."

In bar and 12-inch mill scales there was added to clause 7: "Except on straight two-high bar mills." The following new clauses were adopted: "12. Companies shall pay not less than one-half the firemen's wages on coal heating furnaces. 13. Night turn roller shall receive not less than one-half the straight price for rolling. 14. That when a mixed heat of iron and steel is worked, and a majority of the heat is iron, then the whole heat shall be paid at iron prices."

Guide, 10-inch, hoop and cotton tie mill scale changes were as follows: New clause 14. "When working non-uniform billets, such as cobbles and scrap yard billets, 21 cents shall be paid for rolling, 10½ cents for heating and 5¼ cents for roughing and catching, each to be added to the straight price per ton for working piles. This to apply when the average output is reduced one-sixth or more. 15. That the price for ¾ by No. 18 Star iron shall be as follows: Roller $3.53, heater $1.76½, rougher and catcher 96 cents. 16. Company shall pay not less than one-half the firemen's wages in coal heating furnaces."

Charles F. Quincy, president of the Railroad Supply Co., Chicago, resigned on May 19, and Henry S. Hawley has been elected president and treasurer. Mr. Quincy will be identified with the Q. & C. Co.

THE STEEL CASTINGS CONSOLIDATION.

NEW YORK, June 3.—In spite of the withdrawal of Harris, Gates & Co., as fiscal agents of the proposed American Steel Foundries Co., the project will be pushed and is now nearly completed. Shearson, Hammill & Co., of 71 Broadway, now have the deal in hand. Edward Shearson, senior member of the firm, who recently gave up his position as comptroller of the United States Steel Corporation, said to a representative of *The Iron Trade Review:*

"The substitution of my firm as agents for the syndicate, does not mean that there is any hitch in the proposed consolidation. Under the circumstances it had to suffer a little delay, but that it will go through eventually is something you can state without any qualification. All of the principal subscribers to the stock will permit their subscriptions to remain. Among these are Charles H. Schwab, Elbert H. Gary, and Max Pam. I have made a most careful examination of the business done by the proposed constituent companies, and think the consolidation will mark one of the most stable industrial consolidations that has been formed. The earnings of these companies for the fiscal year ending July 1, 1902, are at the rate of 6 percent upon the preferred stock, and more than 6 percent upon the common stock to be issued by the new company. We are assured by the manufacturers that their business is steadily growing and that their earnings will be largely increased."

In a circular issued by Shearson, Hammill & Co., the following statement in this connection is made: "A gentleman of the highest ability and standing amongst steel manufacturers has been selected for the presidency, and his association with the company will materially add to its success. His name will be announced as soon as he can consistently close his business connections with other steel interests." This is understood to refer to Judge E. H. Gary.

The circular also says: "Some of the genetlemen, largely interested in the success of the enterprise, have been in personal negotiations with the owners of the properties to be acquired, and, as a result, material reductions have been made in the purchase prices and in the expense of organization; but no reduction is made in the amount of the cash and working capital of the new company. It is now proposed to make the present issue of the capitalization of the company $15,000,000 6 percent cumulative preferred, and $15,000,000 common stock, and to form a syndicate to purchase $5,200,000 of each of its preferred stock and common stock."

The companies party to the consolidation are the six originally named in these columns: American Steel Casting Co., of New Jersey, with active plants at Thurlow, Pa., Sharon, Pa., and Alliance, O.; Reliance Steel Casting Co., Ltd., of Pittsburg; Leighton & Howard Steel Co., of St. Louis, Mo.; Franklin Steel Casting Co., of Franklin, Pa.; The Sargent Co., of Chicago; American Steel Foundry Co., of St. Louis.

Personal.

C. S. Powell, of Cleveland, representing the Westinghouse Electric & Mfg. Co., sails this week for Europe.

Geo. D. Wick, president of the Youngstown Iron Sheet & Tube Co., will probably remain in Europe for some time seeking rest and health. It has not been decided as yet who will succeed him as president of the company.

At a meeting on June 3 of the directors of the United States Steel Corporation, William E. Dodge and Percival Roberts, Jr., offered their resignation as directors. Mr. Dodge is succeeded by Robert Bacon, of J. P. Morgan & Co. James Gayley, first vice president of the steel corporation, and in chage of its iron mines and transportation, was elected to succeed Mr. Roberts.

The Chicago Gear & Mill Supply Co. was recently organized under the management of W. C. Groetzinger, who sold his interest in the Chas. Munson Belting Co. and now gives his entire attention to gear cutting and mill supplies. The company manufactures gears of all kinds of metal, and its specialty is of rawhide material. These gears and pinions are manufactured by the "Dermaglutine" process, the hide being specially prepared. They have steadily enlarged their field within the past ten years, especially in street railway uses. The company has facilities for turning out all kinds of gears at its new quarters, No. 13 West Madison St., Chicago. In connection with the manufacture of pinions the company also handles mill supplies extensively, especially leather belting, lace leather, etc.

Evolution of the American Machinery Trade.--II.

MANNING, MAXWELL & MOORE.

Probably no firm name is better or more widely known in the development of the merchant side of the machinery trade of the United States than that of Manning, Maxwell & Moore. Under its own name it has sought no repute as a manufacturer; rather it has made a unique place for itself in the machinery world by magnifying the office of the purveyor—a vital link between the manufacturer of tools and the buyer. At the same time the members of the firm have a controlling interest in a half-dozen companies engaged in the manufacture of power specialties and machine shop equipment.

There has been a disputed question as to the extent to which selling firms operating on broad lines—not merely selling machinery on commission, but buying in large quantities and marketing as they are able to in the ordinary course of business—can serve the manufacturer on the one hand and the user of machinery on the other. Whatever individual opinion or theory may be as to the province of a purely selling house, Manning, Maxwell & Moore have demonstrated in a conspicuous way the practical value to the trade of a strong organization touching every department of metal working operations, and able through its connections to furnish complete equipment for machine shop, foundry, or pattern shop, boiler works, railroad shop, wood-working establishment or smith shop. In a symposium on this subject which appeared in *The Iron Trade Review* some time ago, the pros and cons of the agency question were quite thoroughly discussed. The position was taken by some of our contributors that while the manufacturer might not be the gainer by manufacturing for a dealer and putting the latter's name on the machine, the manufacturer often had much to gain from a selling arrangement where his individuality was preserved by putting his name on everything that went from his shop. It was argued that the chief advantage to the buyer in dealing with a large selling concern was his ability to see full lines of the machinery he wanted and to make his selections from stock. The argument has been commonly advanced that on special machines the maker can do better by going direct to the trade, and this is commonly the procedure on special machines. But it is true also that the larger organizations among machinery distributors are more and more seeking not only to fill the field of merchants, but through salesmen graduated from the shop, and engineers who study the demands of the trade, to aid the buyer in getting the equipment best adapted to his needs.

The firm of Manning, Maxwell & Moore is the outgrowth of the engineering and manufacturers' supply house of H. S. Manning & Co., of 111 Liberty St., New York, which dates back to 1873. The original firm's line of machinists' supplies gave little suggestion of the extensive operations of today in machine tools, being limited in the early days to taps, bolt-cutters and the like. In 1881 the firm name was changed to Manning, Maxwell & Moore, the partners being H. S. Manning, Eugene L. Maxwell and Chas. A. Moore. Mr. Maxwell's death in 1895 has left the business in the hands of Messrs. Manning and Moore. Previous to going to New York Mr. Moore had been connected at Boston with the manufacture of steam specialties, the products of the Ashcroft Mfg. Co. and the Consolidated Safety Valve Co. and had a wide acquaintance among consumers of these goods.

One of the first achievements of the present firm was the publication in 1882 of its encyclopedic catalogue of machinery and supplies, probably the most comprehensive compilation of manufacturers' lists that goes out to the trade. The 1894 edition, composed of 1,153 imperial quarto pages, was the last one in which machinery and supplies were carried together. In 1901 a separate machine tool catalogue of 704 pages to the number of 25,000, was issued, and in 1902 a separate volume appeared devoted to supplies, and containing 1,056 pages. Of this 15,000 were published. They have gone to every land under the sun in which machinery is employed, and have been the forerunners of important contributions to American machinery exports. The encyclopedic character of this literature seems to have become so well connected with it that a foreign correspondent of the firm wrote not long ago asking some details concerning its line of balloons. It was taken for granted that if these were not listed and numbered, they were at least handled. The machine tool catalogue for 1901, which like that for supplies is 10x13 inches, contains 2,021 illustrations of tools, the numbers by which the machines are known in all the company's transactions running from 8,600 to 10,681. In their trade with South Africa and other distant countries, growing out of the wide dissemination of its catalogues, Manning, Maxwell & Moore have handled many varieties of exchange, and in some instances have received their pay in gold dust from a prospector's camp.

H. S. MANNING.

C. A. MOORE.

In addition to the offices and store rooms at 85, 87 and 89 Liberty St., New York, which are their present headquarters, Manning, Maxwell & Moore have a store in Boston, a store in Chicago, an office and warehouse in Pittsburg, and offices in Philadelphia and Cleveland. Their London agents are Chas. Neat & Co., 112 Victoria St., and they have agencies also in Berlin, Paris and St. Petersburg. As noted above, while the firm as such is known as a dealer and distributor of machinery and supplies, it has control in a number of companies manufac-

turing specialties. These are the Shaw Electric Crane Co., of Muskegon, Mich., manufacturer of cranes; the Pedrick & Ayer Co., of Philadelphia, manufacturing air hoists, cranes, air compressors, compressed air riveters and other pneumatic tools; the Ashcroft Mfg. Co., steam gauges, recording gauges, and other engineers' appliances; the Consolidated Safety Valve Co., manufacturer of pop safety valves; the Hancock Inspirator Co., of Boston, manufacturer of the Hancock inspirator, and the Hayden & Derby Mfg. Co., manufacturer of the Metropolitan injector. Manning, Maxwell & Moore had control also for some years of the Pond Machine Tool Co., of Plainfield, N. J., but this was sold to the Niles Tool Works Co. interests in 1898, and became part of the Niles-Bement-Pond Co.

In a recent interview with C. A. Moore I asked concerning the changes in the methods of selling machinery that have come into the business since the establishment of his firm.

"Perhaps the principal change is from the exclusive representation of one maker of a certain tool that once prevailed. Instead of this a selling house can now take two or three kindred lines, giving it a larger scope. One of these tools may be, for example, a very fine, high grade, 16-inch lathe and another may be a less expensive but a substantial lathe for rougher work, less exacting in its requirements, and having different features. The two makers will not be jealous over our handling both, for we have established ourselves in such a manner that we can trade with both. We can sell two lathes from different factories and the makers do not object. For instance, we take almost the entire output of the F. E. Reid Co., of Worcester, Mass., and we also sell the Hendey & Norton lathes, and there is no objection by either party."

Reference being made to the great diversification of product in the machine tool industry, and the continued duplications on the manufacturing side, in the face of the tendency in nearly every industry toward concentration and the lessening of repitious production, Mr. Moore made this comment:

"The multiplication of manufacturing concerns in the machine tool business is due to the fact that it is peculiarly an industry of off-shoots. It is very much like the swarming of new hives of bees. A foreman or a superintendent gets on in his work and develops a good idea. Someone puts up the money to push it, and he gets out and starts a shop himself on one article that he thinks is better than the one he has been making, or that involves a new departure. There is probably a greater desire among men working in mechanical lines to be proprietor manufacturers, to work for themselves, than in almost any other. And from the single line on which these new enterprises start, to a diversity of product, progress is natural. They take up a certain line of lathes, and pretty soon customers want a larger line and they have to enlarge their outfit of patterns. And then their trade calls for upright drills, and so on. But in the last few years, fortunately, machine tool men have been rather more inclined to confine themselves specially to one branch—that is, one concern making lathes, another upright drills and another radial drills. For instance, the large tool builders have in a measure consolidated, the Niles, the Bement-Miles and the Pond concerns being now together in the Niles-Bement-Pond Co. They have gone together on the large tools. The way things were going in the multiplication of tools, for a concern to make one upright drill or one lathe of a certain kind and sell it at the competitive price established would cost it more than it could get out of the transaction. To go on that plan competing with everybody on everything would eventually break a concern. To get a profit they must make a dozen, twenty, fifty of one kind. Take these big radial drills. We couldn't afford to get out six; we have to get out 25 or 50 and carry them until they're sold. The smaller concerns have learned that they can't make the large variety of tools they used to make. They are finding out the advantage of confining themselves within certain lines, and the men who have done that have made money. The F. E. Reid Co. has stuck to lathes not larger than 26 inches; and the Barneses have made a great reputation in the field of upright drills. Now it has come about with these concerns that confine themselves to a certain line, that for the manufacturer to have his own men traveling for his single line is too expensive. The traveling man only occasionally finds a buyer who wants an upright drill. Therefore the necessity for the jobber or general distributor is greater than it ever was, since the average manufacturing concern does not make as complete a line as formerly. The manufacturer who sets out to accommodate every customer must have an enormous establishment and carry a vast line of patterns. The man who specializes can wipe all that outfit of patterns out. Having all his patterns steadily in use the smaller manufacturer keys up and lets himself out. His operations permit of greater elasticity, and he can better adapt himself to conditions in the trade."

"Is it the tendency, then, for the manufacturer of machinery to commit the sale of his product more largely to selling firms than used to be the case?"

"It is. Where there used to be here in New York a direct representative of an individual manufacturer, with an office and perhaps a small stock of machines, this direct agent has now disappeared and the business has been turned over to houses carrying a full line. Yet there are manufacturers who will not allow such a house to carry another line that is in competition with their own. As an example of the old regime, Pratt & Whitney had a great line and their own selling organization, and they had their own places to which their traveling men went, hardly ever allowing the dealer to do much with them. But the drift today in manufacture is toward specialization, and I think that very thing makes it more necessary to have these strong distributing agencies—the jobber or the machinery department store, as we have in a way—so that by aggregating these various products we have a sufficient line to suit any customer. Another feature of this arrangement is that the large dealer will often let the manufacturer go on manufacturing even though he piles the goods up. We say to him, 'Go right on; don't stop because of a dull month.' And there is thus piled up $50,000 to $100,000 worth of machinery at the factory and the dealer furnishes the money."

Replying to a question as to the tendency in the matter of variations from standard types of machines—whether it is more the rule to repeat standard types than to depart from them—Mr. Moore said:

"Manufacturers and dealers avoid as much as they can anything on the special order. When a man comes along with a pencil and says, 'We want this so and so,' we have learned that while the change on paper seems not to represent much, sometimes it turns out to mean more than the profit on the tool. The inclination of the man who is out selling to the trade is all the time to bend to the peculiar wants of a customer. But it is exceedingly expensive, and customers are learning more and more to take the standard. For instance, a large manufacturing company came to us recently and on their list they had 103 tools. We were able to furnish them with 102. Warehouses are provided now for the storage of large lots of machinery, as it is too expensive to keep them in down-town stores."

"What of our foreign machinery trade and the outlook for it?"

"Well, our foreign trade has been somewhat curtailed owing to the depression in Germany; but the general sentiment in Germany has not been favorable to American goods. I said in an interview a while ago that some of the trouble lay in the fact that we have not been careful with the goods we ship abroad. For one thing we don't know how to pack goods. I saw stoves landed at the Paris Exposition—beautiful in design and in trimming—with not a whole leg or a door on them—all broken because of bad packing. We have much to learn about packing. In our own business we have given great attention to packing for sea shipment, but you may send an order for a big tool to a manufacturer who hasn't the remotest idea how to do these things, and it is very doubtful if that tool packed by him reaches the customer in good condition. Machinery must be put up strong and boxed in, just as you would build a great strong building, in order to hold properly. We send our own men to the factory to pack our export machinery. They build up a great framework and cover every part in carefully. The machines are taken down and the parts likely to be broken are packed with great care in separate boxes."

"How far has the imitation of American machinery by foreign manufacturers hurt our trade on the other side?"

"Very little. The goods they have attempted in that way are not satisfactory even to their own customers. Their imitations lack the essential features of our tools. It is like copying a painting. The deficiencies of the imitations have been proved time and again. Very few shops across the water have American workmen. But we are progressive and up to date, and by the time they have a copy on the market we are out with something new that is better than the original. The tool of today in some lines is likely to be a back number a year from now. Our trade in machinery with Great Britain has held up well. France and Germany have given us good business and Russia can be made a wonderful field for our manufacturers. We have just begun there. We furnished the tools for those great locomotive works at Samovar, and we furnished the electric cranes, rail drills, punches, shears, and other equipment for the steel works at Mariopol. The movement is going on all the time. Some of our American manufacturers, you know, are establishing plants on the other side. The Westinghouse Co. Manchester works are a case in point. Another manufacturing company is building works in Russia, and there is a plant in Berlin that is manufacturing the Niles tools for Germany. American manufacturers sold the outfit of tools for the British Westinghouse plant at Manchester, and foreign manufacturers competed and couldn't touch them."

"What would you say as to any tariff changes that should be made, in view of the trade complications between the United States and Russia?"

"Well, I am a protectionist. I think that if the tariff is to be revised it should be revised in the house of its friends. This work should be done intelligently and consistently. I should not object to reciprocity on the line of a reciprocity that reciprocates. But I don't want the kind that gives this, the best market in the world, to foreign manufacturers while they give us nothing in return. Protection has given us wonderful development and splendid wages to our artisans."

Suit Against Steel Corporation Bond Issue.

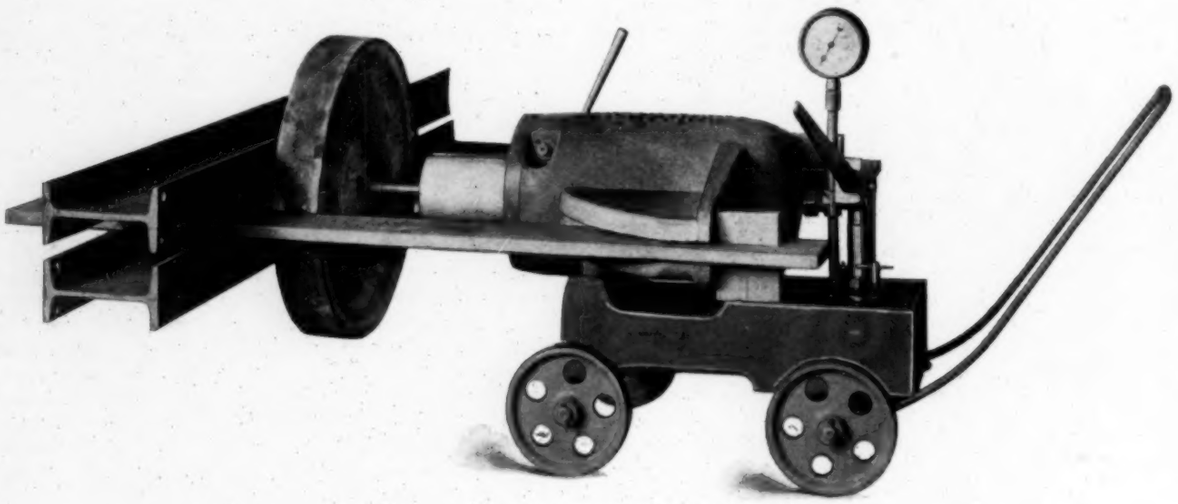
As was expected when objections were made by certain stockholders at the recent stockholders' meeting of the United States Steel Corporation to the plan of exchanging bonds for preferred stock and cash, litigation has been instituted. C. H. Venner & Co., a New Jersey corporation, and James Pollitz, of New York, have brought suit against the corporation to prevent it from carrying the exchange deal into effect. C. H. Venner & Co. own 500 shares of common stock and James Pollitz owns 100 shares of preferred stock. It is alleged that the corporation has no power to issue bonds except in exchange for cash, or in payment for purchased properties. It is also claimed that the corporation has failed to pay the license fee required by the New Jersey corporation laws. The plaintiffs assert that the plan is being put through in order to make certain preferred stockholders become secured creditors, and that it would have been possible to negotiate bonds for cash without paying any 4 percent commission to any syndicate. It is to be noted that all the recent bond issues in Wall street of various descriptions have met legal opposition, which has not been effective to restrain the issue.

A PORTABLE HYDRAULIC PRESS.

The Chas. F. Elmes Engineering Works, of Morgan and Fulton Sts., Chicago, manufacture a portable hydraulic press which the illustration below shows in operation. It is adapted to the work of machine shops, car and railroad shops, and large steam plants for pressing off or on cranks, car wheels, couplings, armatures, etc. It is mounted on wheels so as to be easily removed from place to place. The arm or ram is drawn back by means of a rack and pinion. The pump is made of bronze with hand lever attachment for operating the press. These machines are made in various sizes from 60 tons to 400 and 500 tons. The tank which feeds the pump is on the body of the car. Sales have been made to the following concerns among others: George T. McLaughlin & Co., Boston, 60-ton; P. H. & F. M. Roots Co., Connersville, Ind., 100-ton; Southwark Foundry & Machine Co., Philadelphia, 450-ton; Quincy Engine Works, Quincy, Ill., 300-ton; Knowlson & Kelly, Troy, N. Y., 350-ton.

Obituary.

Walton C. Waterbury, formerly president of the firm of Forster, Waterbury & Co., Franklin Park, Ill., died at his home in LaGrange, Ill., May 29, of consumption. Mr. Waterbury was born in Lapeer, Mich., 44 years ago, and went to Chicago in 1889, entering the office of Rogers, Brown & Merwin as stenographer. He continued in this company's employ until 1892, when he took a position as salesman with Forster, Backmann & Hawes, at that time sales agents for the new Iroquois furnace. This firm was afterward changed to Forster, Hawes & Co., and finally, in 1896, upon the retirement of A. C. Hawes, was changed again to Forster, Waterbury & Co., Mr. Waterbury being made president. He continued in this capacity until the Iroquois Furnace Co. passed into the control of Rogers Brown & Co. in March, 1899, and then organized the firm of Forster Waterbury & Co., which erected and put into operation a malleable iron foundry at Franklin Park, Ill. Owing to ill health, Mr. Waterbury was forced to retire from the firm in 1900 and did not again engage in the iron business until the three months preceding his death, during which time he was associated with David Evans in the Chicago office of the Sloss-Sheffield Steel & Iron Co. as salesman. Mr. Waterbury was known as a man of wide reputation on all subjects relating to the manufacture and use of iron, and throughout his entire career in business he bore a high reputation among his associates. Possessed of a striking personality, his moral sense was never clouded by any idea of personal interest. He leaves a wife and two children.



PORTABLE HYDRAULIC PRESS.

The Chainworkers' Union of the United States began a week's annual convention at Braddock, Pa., Monday of this week. The organization covers the chain makers pretty generally throughout the country and is formulating the annual scale.

The Machinery and Metal Working Trades—News Letters from Selling Centers.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, NO. 150 NASSAU ST.

NEW YORK, June 2.—The machinery market in May was notable for its steady undertone. By comparison with March and April it would seem that the volume of business fell off, but by no means to such an extent as to give cause for complaint. Several of the larger concerns say that the month with them was the most satisfactory they have yet had; but the general run of houses, as before stated, found a slight falling off in the business transacted. Large orders seemed to be the exception; but small ones poured in daily, throughout the month, and in many cases came in the form of a genuine relief, the character of the machinery and supplies called for being such as to make the execution of the orders a matter of comparatively quick performance.

The month was marked for one thing, however, and that was the increase in prices which was made. In some quarters there appears a disposition to question this, but the trade in general will certainly wake up to a realization of the fact later on. At the offices of the Niles-Bement-Pond Co. it was stated that prices on the general run of machinery manufactured by the company had been increased by 5 percent, while on some the increase amounted to 10 percent. It was said that the increases were made compulsory by the advance in foundry pig iron. It was thought that prices now quoted on heavy machinery would continue to prevail until the end of the present year. At the office of Manning, Maxwell & Moore it was reported that the house had heard of several tools being advanced 5 percent. It was added that whatever doubt existed as to prices having been raised, there was no doubt whatever that they showed a tendency to stiffen. As for the outlook, this firm was inclined to the belief that while slight increases may be made here and there, as a general rule prices would remain as at present for the balance of the year. A representative of the Prentiss Tool & Supply Co. said information had reached his company that an advance of 5 percent on prices was about to be made by three concerns, whose output mostly consisted of lathes. However, general advices to his company indicated that prices would remain at about what they are now until the end of the year.

There is no doubt that there is a strong disinclination everywhere to advances beyond those made. Those who argue against them do so on the theory that inasmuch as a general falling off in the volume of business is likely to occur during the heated term, any advance in prices might turn the tide of trade. In this connection it is worthy of note that in building lines and in other quarters the opinion prevails that in a few months prices will show a decrease. It is especially prevalent among projectors of new industrial enterprises. A local machinery house had almost closed a deal for equipping a sugar refinery, but at the last moment the projectors decided to wait until the fall, believing that material could be purchased at more reasonable prices than now. Another house had a similar experience with a proposed chemical works, the promoters of which concluded to wait until the fall to purchase their equipment, on the belief that prices will have eased up by then.

Another feature of the month of May was the appearance of railroads in the market as large purchasers. There was scarcely a railroad of any note that was not heard from in this connection. Some of the railroads which were particularly heavy buyers were the Delaware, Lackawanna & Western, the New York Central, New York, New Haven & Hartford, and the Atchison, Topeka & Santa Fe. Most of the machinery purchased was for the shops of the companies.

Dissatisfaction still continues in the matter of deliveries, and it was accentuated during the month by labor disturbances. This is particularly the case with establishments in Worcester, Mass., where the manufacturers are resisting the demands of their men. Deliveries of such tools as lathes, boring mills, planers, punches, shears and milling machines, have reached what a local agent terms the "acute stage." Orders can rarely be taken except for five or six months' delivery. In small tools, the delay is not as pronounced as it was a short time ago, although opinion is not unanimous on this point.

During June the Government is expected to make some heavy purchases of machinery for use at the various navy yards. The Government's fiscal year will end on July 1, and various bureaus knowing approximately their balances will utilize them in purchasing needed equipment. The generally optimistic views expressed as to the outlook are based, in a large measure, on reports that industrial enterprises on a large scale are contemplated. This is especially true in the South, where considerable Northern capital is finding its way for the establishment of plants to manufacture cotton products. Then again the general prosperity among manufacturers will mean further improvement and enlargement of plants and the purchase of new equipment.

The export trade during May was devoid of any transactions of note. American manufacturers are so much engrossed in filling domestic orders that they do not care to seek foreign business. Inquiries from abroad are frequently accompanied by urgent requests for immediate delivery, something altogether out of the question. The average English manufacturer contemplating the purchase of machinery would much prefer that of American make, but he cannot get his order filled with any degree of promptness. Because of this German manufacturers are making headway in disposing of the immense amount of machinery they have on hand, because of the industrial stagnation in that country. Another thing which hurts the American market is the willingness of German manufacturers to sell at cost, either to deplete the surplus stock they have on hand, or to keep their establishments in operation. This is not only true of iron and steel and kindred lines, but of almost all manufactures.

Recent developments would indicate that our agricultural machinery is growing in popularity abroad. Some very heavy shipments were made in the past few weeks, while inquiries are being made with greater frequency than ever. Consular reports from Europe, notably from Persia, contain assurances that the superior merit of American agricultural implements is becoming more and more recognized.

There has been some inquiry from abroad for American malleable iron castings. A large exporter is authority for the statement that he recently tried to place an order in this country, but was unsuccessful. It has been his experience that Americans do not mind getting a casting that is a little rough, but the average foreigner wants his to be as smooth as glass. This is why, he believed, makers of castings in this country prefer to confine their operations to the home market.

At the New York offices of the Chicago Pneumatic Tool Co., No. 95 Liberty St., business has been unusually brisk of late. That done during May is reported to be the best in the history of the company. The extensive construction of "sky scrapers" in and around Greater New York during the past year, has created a demand for pneumatic riveting tools as well as the air compressors which accompany them. Pneumatic tools are found most effective in expediting construction. Some very large orders were received by the above company in May. One of these was from Germany, and was for 267 tools. Another was from London, and called for 160 tools. The company will push its trade with European ship yards and has sent Thomas Aldcorn, its Eastern general sales agent abroad for that purpose. Mr. Aldcorn will remain in Europe for several months. He was accompanied by two of the best workmen in the company's shops.

The American Wood Working Machinery Co., 136 Liberty St., is finding it difficult to fill the orders on its books. This is especially true of its timber sizers, for which there has been a large demand recently. It had good sized orders recently from the Whitesville Lumber Co., Whitesville, N. C.; Chesterfield Lumber Co., Cheraw, N. C., and the High Point Furniture

Co., High Point, N. C. The company has been making extensive improvements to its plants recently, particularly those at Norwich, Conn., Rochester, N. Y., and Williamsport, Pa.

Wickes Brothers, dealers in new and second hand machinery, whose shops and main offices are at Saginaw, Mich., have purchased a building, 100x400 feet on West Side Ave., Jersey City, N. J., which they will utilize as a warehouse. The building is near the West Side Ave. station of the New Jersey Central Railroad, with which track connection will be made. The firm's trade in the East of late has been such as to necessitate a building of the kind. Charles Bertolette, who has been engaged in the machinery business in Philadelphia for nearly a quarter of a century, will be in charge of the warehouse.

The George V. Cresson Co., No. 141 Liberty St., has disposed of considerable power transmission machinery lately for installation in large mills in Mexico. It also executed a large order for mills in Cuba. The foreign trade of the company is not as good as it might be, although substantial orders have been received from England, France, and South Africa.

Charles Churchill, of Charles Churchill & Co., Ltd., London, Eng., who has been in this country for several weeks, sailed for home last Saturday. He expressed himself as most gratified with his trip. While his visit was chiefly for rest and recreation, his plans underwent considerable change in consequence of letters and cablegrams from London of a business character. Referring to the labor situation in the United States, Mr. Churchill said that unless the labor unions of this country displayed a more reasonable spirit toward manufacturers, the industrial situation here would be thrown in a ferment some day. While he thought the limit of pernicious activity was reached by labor unions in England where they offered physical resistance to the introduction of labor saving machinery, he was surprised to find similar bodies in America making demands which were even more reprehensible.

At the offices of the American Engine Co., No. 95 Liberty St., Edwin S. Boyer, manager, said that the company's plant at Bound Brook, N. J., was exceptionally busy on orders for duplex compound engines. Four of these engines were recently sold to N. Snellenberg & Co., Philadelphia; two to the Standard Steel Works, Burnham, Pa.; and one each to the National White Lead Co., Brooklyn, N. Y.; Sea Cliff Electric Light & Power Co., Sea Cliff, Long Island; C. W. Maslind & Sons, Philadelphia, Pa.; Hawley & Hoops Mfg. Co., New York City, and the Descubridorn Mining & Smelting Co., Durango, Mex. The company is now several months behind in its orders, and cannot promise delivery for its large size engines for eight or nine months.

Rossiter, MacGovern & Co., at No. 141 Broadway, report that their second hand machinery business is in a very satisfactory condition. They recently made large shipments of electrical machinery to the Massachusetts Electric Light Co., for installation in various places throughout the Eastern part of New England, and to Dallas, Tex.

Plans are now under way for the introduction of additional machinery in the plant of the Rome Locomotive & Machine Works, Rome, N. Y., which is owned and operated by the Compressed Air Co. It is proposed to spend $50,000 for this purpose. The new machinery will be installed under the direction of H. Monkhouse, Rome, N. Y., to whom all communications should be addressed. The compressed air company has not been successful in introducing its air cars. Not long ago it had some in operation on several streets in New York City, but these were withdrawn, it having been found by the railroad company that electricity gave better results. The new machinery will be used for the most part in building and repairing steam locomotives.

The Garvin Machine Co., at Spring and Varick Sts., has its plant at Lindale, Ga. The order for the boiler equipment was utmost capacity. Its working force is now the largest in its history, over 600 men being employed.

The Massachusetts Mills, at Lowell, Mass., recently purchased large quantities of machinery for installation in their plant at Lindole, Ga. The order for the boiler equipment was given to the Aultman & Taylor Co., Mansfield, O.

M. H. Treadwell & Co., of No. 95-97 Liberty St., engineers, founders, and machinists, are doing considerable work on open-hearth steel furnaces, especially in and around Pittsburg. The company has also received some good orders for its standard and narrow gauge cars.

The Rockwell Engineering Co., of No. 26 Cortlandt St., has done an exceptionally good business during the present month. A few days ago they succeeded in obtaining the largest order ever placed for fuel oil burning appliances. The J. M. Guffey Petroleum Co. was the purchaser. The order comprised three of the company's largest size oil pumping systems and 150 oil burners. The new machinery will be installed in the Guffey company's refinery at Port Arthur, Tex. The business of the Rockwell company has grown to such proportions recently that they have found it necessary to add several rooms, giving them one of the finest suite of offices among manufacturing concerns around New York.

James Beggs & Co., of 9 Dey St., manufacturers and dealers in machinery tools and supplies, have received some substantial orders recently. One of these is for some $80,000 worth of machinery for installation in the new plant of the American Match Co., at Avondale, N. J. Back of this order is a story which demonstrates that courtesy in business relations is often productive of trade. A little over two years ago a man entered the Beggs company store, looking for a small cock lubricator which he wanted to use in connection with some experiments on a machine he was about to patent for manufacturing matches. He said he had been looking for this article for several weeks without success. The salesman told him the company had not the kind of lubricator he wanted in stock, but would try to get it if he would leave his order. This was done. The customer returned the next day and secured the lubricator, which cost him 50 cents. He went away decidedly pleased. Later on he succeeded in patenting his machine, and was even more fortunate in getting capitalists interested in it. In a short time a company was formed known as the American Match Co., and it decided to erect a plant at Avondale for the manufacture of matches. When completed, as it will be in a few weeks, it will represent a large outlay and will constitute the most formidable rival to the Diamond Match Co. The inventor of the machine remembered the courtesy shown him by the salesman at Beggs & Co., and when the American Match Co. was incorporated succeeded in having the order for the necessary machinery and equipment given to this firm.

The Eclipse Co., of 26 Cortlandt St., Eastern agents of the C. H. Shaw Pneumatic Tool Co., of Denver, Col., placed a large number of orders for pneumatic tools lately. They furnished the Standard Oil Works, at Baltimore, Md., with ten chipping and riveting hammers and four drills; the Bethlehem Steel Co., South Bethlehem, Pa., with one dozen chipping hammers, making 40 in all sold to that company; the American Steel Foundry Co., St. Louis, Mo., with one dozen chipping hammers; John Rohan & Son, St. Louis, Mo., with four chipping hammers; the Tidewater Oil Co., Bayonne, N. J., with two riveting hammers; the Joseph Cody & Sons, Peoria, Ill., with nine riveting hammers, and the McAleenan Boiler Works, Peoria, Ill., with four riveting hammers. The necessary air compressors were furnished for the most part by the Ingersoll-Sergeant Drill Co., of 26 Cortlandt St.

The centrifugal pump business of Henry R. Worthington, of No. 114-118 Liberty St., has assumed great proportions recently. In May an order was received from the Brazoria Irrigation Co., of Houston, Tex., for three 36-inch pumps, two being of the coroidal type, and one of the turbine type. These pumps will have the unique distinction of being the first ever built of their kind in this country. A test recently made on one of the centrifugal pumps manufactured by this concern showed that when submitted to 165 pounds water pressure it maintained 70 percent efficiency above that. The concern also received an order for two 6-inch centrifugal pumps to be use for elevator service against 120 pounds water pressure, and to deliver 500 gallons a minute. Only orders for high pressure pumps are being received nowadays, in consequence of the shops being operated to their full capacity. Orders for low pressure pumps are not being sought, and in many cases have been refused.

Many large orders for machinery were recently given by the New York Edison Co., at No. 57 Duane St., many firms sharing in the distribution. In a few days the company will award a contract for two large compound boiler feed pumps, of the pattern pressure type, for installation in its power house at

39th St. and the East River. It has received some 15 bids for the same. A representative of the company stated that its business was getting so extensive that it was highly probable that it will be in the market for considerable machinery in the near future.

Manning, Maxwell & Moore, of 85-89 Liberty St., report their May business to have been as good as for any month they have yet had. They have secured orders for the equipment of several large plants, while their Government business has been of very gratifying proportions. The outlook for the present month in this line is of the most hopeful kind. They are having considerable difficulty in filling their orders for cranes, the plant at Muskegon, Mich., being over a year behind the orders at present on its books.

The Prentiss Tool & Supply Co., 115 Liberty St., found its May business a trifle smaller than that done in April. They received a large order for screw machines for installation at the plant of the General Electric Co., at Schenectady, N. Y., and an order for a planer, lathe, boring mill, and Bickford radial drill, aggregating over $20,000, from the Union Steam Specialty Co., of Scranton, Pa. The company acts as Eastern agent for the Cincinnati Milling Machine Co., and says it could dispose of twice as many of the latter's machines if deliveries could be made with more dispatch.

The Niles-Bement-Pond Co., of 136 Liberty St., had a large business in May. The Atchison, Topeka & Santa Fe Railroad purchased a large quantity of machine tools from this company recently.

From statements made by manufacturers of pumping machinery it would seem that there is a growing reluctance to bidding for municipal work. A large manufacturer, who has had over 20 years' experience in this branch of the business, said to the writer recently: "There was a time when an opportunity to bid on pumping machinery for municipalities was eagerly sought, because of the substantial profits it offered. No such conditions prevail now. After an experience of over 20 years in the business, I have decided to bid on no more municipal work, and several concerns I could name have either come to the same conclusion or strongly incline that way. Specifications are drawn with such exactness as to put the municipality to no risk at all, and the bidder to every kind of a risk. If you have a contract awarded you, the execution of it is attended with innumerable difficulties, and unless you get on the right side of the inspector or engineer, as the case may be, your troubles are numerous. Then again, the 'grafting' instinct in public officials seems to be on the increase, and unless you cater to it you might just as well throw up your hands. To put it plainly, in getting a municipal contract on one hand, and completing it on the other, and I might add, having payment for your work made in a reasonable time, it's truly a case where 'money makes the mare go.' Because of the things I have mentioned, bids for municipal work are always made at higher prices than those submitted to private firms or corporations, so that the bidders will be on the safe side. A striking illustration of the truth of my statement was afforded in the bids for pumping machinery recently opened by the city of Allegheny, Pa. If you contrast them with bids made for similar work not long ago, and especially if you contrast them with bids which have been obtained, and are obtainable, by private firms and corporations, you will find the prices considerably higher."

CINCINNATI.

CINCINNATI, June 2.—It is predicted that there will be an advance in machine tools within the next week or two by all of the concerns that have not made an advance thus far. This advance will be made on the ground of increased cost of product due to higher prices for both labor and material. Labor has advanced during the past year in common with labor in almost all branches, and the advance in castings has followed the increased cost of pig iron. Machine tool men figure that if they do not put the price of their product where they will be able to make money now they will never be able to get cost out of their product. Therefore they figure that an advance of at least 10 percent will be a reasonable one. The advance will probably be made at once. Some concerns have already made something of an advance and such as have done so will not farther advance the cost of their product, unless it has been less than 10 percent. In this case they will make an advance up to 10 percent.

General trade with the machine tool men is very good. The demand is mainly from the domestic end of the business, though inquiries are better according to reports from foreign agents. Many of the machine tool builders are so far behind in getting out their goods that they are compelled to promise long deliveries on all new business taken. Inasmuch as everybody is in about the same condition there is not the worry and dissatisfaction that might exist.

The Cincinnati Electric Motor Co. has opened its new manufacturing and office headquarters on East Sixth St. near Broadway. The concern has been in existence about two years and has developed a very considerable business in the manufacture of small motors ranging from ½ to 10 horsepower. The demand for the product has been steadily growing. The company works more to the perfection of small motors than to the manufacture of large ones or to production in large numbers.

A new foundry will be built by the Peck-Williamson Heating & Ventilating Co., at Wellston, O. It will have a capacity of 100 tons a day and will be built and operated by a separate company known as the Peck-Williamson Foundry Co. This company will have a capital of $100,000 or over and work on the new plant will begin at once.

It is stated that an attempt will be again made to combine into one concern the laundry machinery factories in the country. If the deal should go through it will take in the American Laundry Machine Co. and the F. M. Watkins Co., of Cincinnati. Both of these concerns figured in the deal the last time it was taken up. It is doubtful if the plan will ever be a success, as the F. M. Watkins Co. recently moved into its new factory in the West End and the American Co. is now building a new factory plant in Norwood.

The J. H. McGowan Co. is arranging to turn out an entire new line of duplex pumps. The company is having all of its plans for pumps of this style redrawn and will not have a pump of the kind turned out after the new plans are completed but that will be a complete remodeling of the old styles. The company has recently been doing a very large business in municipal water works pumping contracts.

The Houston, Stanwood & Gamble Co. reports that it has a larger demand for engines for saw mills and similar uses in the South than at any time in its history. The company has a reputation for high grade stationary engines.

A strike of some of the workmen in the big machine shop of the Block-Pollak Iron Co. was settled this week and the men have all returned to work. The demand was for a shorter day.

The Lunkenheimer Co. will soon have completed the office building that has been erected in connection with the Fairmount works. The company has been having a very large business in its valves and all kinds of fittings and lubricating devices. When it is fully established in its new quarters it will be in a position to increase largely its output.

The Lodge & Shipley Machine Tool Co. is having its most successful year and the demand for its lathes is unprecedented. The company is in great need of the additional space that will be provided by the erection of the new extension to the shop and when that is in the capacity and output will be increased almost 100 percent.

The Louis Lipp Co. makes the report that the demand for its bath tubs, closets and kindred supplies is greater than in the history of the concern. As soon as the company is fully located in the new factory at Winton Place it is intended to utilize the old location as a foundry.

The damage done to the factory of J. H. Day & Co. by the heavy storm of ten days ago has been all repaired and the firm is in full operation.

The Cincinnati Machine Tool Co. has received a gold medal for its exhibit of drills at the Charleston Exposition. This concern has been doing a very large business and has found it necessary to made additions to its plant, not only in the way of buildings but also in increased equipments. It has been putting in a large number of new tools and when the present alterations are completed the plant will be increased by about one-third.

The Cincinnati Screw & Tap Co. reports a very good business in its special machinery and is finding its capacity so restricted on account of growing business that the additions are being completed far too slowly for the actual needs. The concern will soon have increased its plant to about double its former capacity and it is still in the market for a good line of screw finishing machines that are to be installed in the new part.

Wm. E. Gang & Co. report that business is very good and that there is a marked improvement in the domestic trade, though as much cannot be said for the foreign demand for radial drills such as the firm manufactures.

The J. A. Fay & Egan Co. has just closed a deal through its Buffalo branch with the Geo. L. Squiers Mfg. Co., of Buffalo, N. Y., for a lot of heavy woodworking machinery to go to Africa.

The American Tool Works Co., of Cincinnati, manufacturer of a large line of metal working machinery, including engine lathes, planers, shapers, upright drills, radial drills, screw machines, brass-working machinery, etc., is just opening up a new store and office in the machinery district of St. Louis, at 720 North Second St., at which address a representative stock of the company's machines will be on exhibition. A. B. Bowman, who has been identified with machinery business in St. Louis for a great many years, will be the agent at that office.

The Norwood Bicycle Co. announces that the name of the company has been changed from the Norwood Bicycle Co. to the Norwood Machine & Manufacturing Co. The change is merely in name and does not in any way affect the company, or its relations to those with whom it has had dealings. There has been a reorganization of the business, together with improvements in the plant which will permit of a larger output of special machinery.

PHILADELPHIA.

PHILADELPHIA, June 2.—The past four weeks have shown only continuation of heavy business in the Philadelphia machinery market. It's the same cry one hears in every direction—plenty of business offering, and a full shop. Few concerns, indeed, have not at least three months' business ahead; and many of them have enough to carry them along several months more. No special effort is being made to secure orders. They seem to come along as a matter of course. At the same time no orders appear to be turned down on account of the amount of business in hand. Time of delivery cuts some figure in the placing of an order, but as a general thing buyers realize that one concern is crowded about as much as another. A leading concern here was recently in the market for a 48-inch planer, and approached all the principal makers but could not get anything like early shipment. They finally found a dealer who happened to have one coming along from a maker and he could supply it in two weeks. Some of the dealers placed speculative orders for large machine tools several months ago, and as these mature there is no difficulty in making ready sales at good prices.

Foreign inquiries are not very plentiful, nor are they invited to any extent. There is too much business to be taken at home to make foreign trade attractive. While there is always a fair amount of export business in hand in the different shops there is not nearly so much as was in evidence three years ago.

Expansion seems to be a question that is troubling several machinery building concerns just now. As this in almost every case means removal, the subject is one of absorbing interest. Most of the available sites in and around Philadelphia are held at values really too high for consideration, while others are offered on lease only—a plan which hardly suits progressive concerns. One well established machinery builder has been obliged to select a site in a neighboring State; and another who is crowded out by the growth of business may decide upon a similar step.

E. L. Martin, agent for the Union Steam Pump Co., Battle Creek, Mich., has just closed with the Clarksburg Oil Refining Co., Clarksburg, W. Va., for a complete outfit of pumps for their new refinery.

At the different shipyards the work in hand is very heavy and great activity prevails. The Ocean Steamship Co. has just placed an order with the Roach Ship & Engine Building Co., Chester, for a 5,000-ton passenger and freight steamship for the New York & Savannah line, to cost close to $500,000. Her length over all will be 392 feet, and beam 49 feet. She will have four steel decks, and her motive power will consist of four single end Scotch boilers driving a triple expansion engine. September 1, 1903, is the delivery limit.

The director of public works of Philadelphia is about to advertise for the construction and equipment of a new pumping station in connection with the high pressure fire service recently provided in the city proper. This step is in anticipation of the early passage by councils of a loan bill for city improvements which contains an item of $300,000 for the proposed station. The bids, which it is understood are to be opened June 17, are to cover four or more vertical triplex double-acting piston or plunger pumps, with four or more vertical gas engines connected to them. Each pump must be capable of discharging approximately 1,400 gallons of water per minute, and not less than 1,200 gallons, against a pressure of 300 pounds to the square inch.

The Espen-Lucas Machine Works, the formation of which concern was announced last month, have leased a portion of the Belfield building at Broad St. and Pennsylvania Ave., a most convenient location for shipping. Some of their machinery is already installed and they are practically ready for business. They will build cold saws and grinders and machine tools.

The J. W. Creager Machinery Agency, in the Bourse, reports a good business for May. Among the business secured they mention an order for a 72x72x20-foot Fitchburg planer, motor driven, and to weigh 148,000 pounds, from the Fore River Ship & Engine Building Co., Quincy, Mass., and orders for smaller planers from the same concern. The agency also received several orders for Hendey lathes, shapers and millers, and Fosdick & Halloway radial drills. Within a few days they have shipped a carload of Bradford lathes to one party, and nine in one shipment to the Bethlehem Steel Co. They also mention a very large order from the American Locomotive Works for dies made by the Geometric Drill Co.

The Keystone Machine Tool Works have a great deal of business in hand, and report inquiries very plentiful. They are just shipping a combination cold saw and rotary planer to the Walton Iron Works, Cincinnati; and a large cold saw to the Jenks Shipbuilding Co., Port Huron, Mich. They are building two large 36-inch rotary planers for Pittsburg parties, and have several good sized slab milling machines in course of completion to fill orders in hand.

The Philadelphia Machine Tool Works report activity in all their departments, and work enough on their order book to keep them busy several months. They are meeting a good demand for their presses and have under way several of good size, among them an extra heavy press with cast steel frame for Western parties. They are receiving a large number of inquiries for testing machines and booking some good orders.

The Pedrick & Ayer Co., builder of air compressors, pneumatic riveters and hoisting machinery, and railroad tools, is very busy, and has more than six months' work ahead. The works are particularly crowded in their railroad tool department and even with night work have been unable to get much relief. Among the orders in this department is one from the Canadian Pacific Railroad for equipment for its Rocky Mountain service. Business in pneumatic hoists is very brisk, the demand for the new positive hoist being especially large. Among the orders now under way is mentioned one from Rhodes, Curry & Co., Amherst, N. S., for a set of overhead trolleys for moving car bodies. Among recent shipments of pneumatic riveters was one to Aultman, Taylor & Co., Mansfield, O., of a big stationary riveter weighing 15 tons, for driving 1-inch steam-tight rivets in boilers. Orders in hand include one for a pneumatic riveter, 16-foot throat and 54-inch reach for the Central Railroad of New Jersey. This tool will weigh 80 tons, and is probably the largest of this type of machine ever built. A riveter which the company will shortly place on the market will be operated automatically, feeding and driving, and will drive 1,420 rivets per hour. The concern is making preparations to move its works from Philadelphia to Garwood, N. J., at which place it is building quite a plant. Two machine shops, one 520x100 feet, the other about 620x100 feet, with power houses and auxiliary buildings to accommodate a power equipment of about 600 horsepower, have been

contracted for and are in course of erection. It is expected that they will be ready by Oct. 1. Most of the additional shop equipment has been contracted for.

Israel H. Johnson, Jr., & Co., builders of lathes, report business to be in a very satisfactory condition. Many shipments of lathes of all sizes were made during the month just past. Among the larger machines were a 36-inchx52-foot double, and a 35-inchx32-foot single lathe to the Reading Iron Co., Reading, Pa.; a 54-inch lathe to Pittsburg; some 36-inch lathes to the Farrel Foundry & Machine Co., Ansonia, Conn., and a 50-inch lathe to Milwaukee.

The Tabor Mfg. Co., manufacturer of molding machinery, states that the volume of business for May was larger than for any month in the history of its business, and was fully equal to an entire year's business four years ago. Shipments were made up almost entirely of orders for one or two machines to different parties, no unusually large orders figuring, but the aggregate output was very great. Among orders in hand and approaching completion is mentioned one for ten machines for molding radiators for parties in the West.

The Franklin Machine Works, Inc., state that they had a very satisfactory business for May, both in point of orders and shipments. Among their shipments was a large horizontal floor boring, milling and drilling machine for the Wm. Cramp Ship & Engine Building Co., Philadelphia, and similar machines of smaller capacity to parties in New England and Augusta, Ga. Several cold saws and grinders were shipped to points in the East and South.

E. Harrington, Son & Co., builders of machine tools and hoisting apparatus, are running their plant to the fullest extent of its capacity and report orders and inquiries plentiful.

The J. W. Paxson Co. reports the demand for foundry supplies as brisk as ever and the condition of the foundry trade very good, barring the difficulty in obtaining raw materials which prevents the full measure of the good times being enjoyed by the foundrymen. Machinery builders in general complain of delays in the filling of orders for castings.

FIRST YEAR OF THE ALLIS-CHALMERS CO.

The first annual report of the Allis-Chalmers Co., which was incorporated in New Jersey on May 7, 1901, has been made public. It covers the operations of the company from the beginning of business up to April 30, 1902, and makes a favorable showing. Following is the official statement:

Net profits, after deducting all expenses of manufacture and selling, and after making full provision for depreciation of buildings, plant and machinery and for possible bad debts		$1,442,259 51
Deduct—Dividends declared on preferred stock		1,137,500 00
Balance—Surplus carried to balance sheet		$304,759 51

The balance sheet as of April 30 shows:

ASSETS.

Real estate, good will, etc		$27,352,081 92
Bills and accounts receivable	$2,778,720 88	
Stocks of merchandise, materials and work in progress (at cost)	3,333,664 99	
Cash	4,514,167 05	
		10,626,552 92
Total		$37,978,634 84

LIABILITIES.

Capital stock:		
Preferred	$16,250,000 00	
Common	20,000,000 00	
		$36,250,000 00
Accounts payable	$1,139,500 23	
*Dividend No. 4	284,375 00	
		1,423,875 33
Surplus:		
Profits for period	$1,442,259 51	
Less—Dividends on preferred stock	1,137,500 00	
		304,759 51
Total		$37,978,634 84

In his report President Charles Allis says: "The manufacturing operations of the company during the past year have been marked by a demand for the products of the company greatly in excess of the capacity of the works even when operated under their most favorable conditions. The operations of the various works the past year have been greatly hampered and the output seriously restricted owing to the changes necessarily incidental to the consolidation of such large business interests and to the prolonged strike of some of the workmen, the effects of which are still felt at several of the plants. Although the purchase of the several properties was made with their businesses as 'going concerns' as of April 1, 1901, there were so many unfulfilled contracts of importance to complete and such changes in the methods of accounting, stock-taking, cost-keeping and general management to introduce that it was not until July 1 that the new organization was in full control of the officials representing the consolidated business. In the latter part of May the 'International Association of Machinists' called out from every shop of importance in the country all the union workmen, who responded by 'striking' for higher wages, shorter hours and the practical control of the works by a shop committee under the direction of the union. While this action was national in its extent, the demands were not the same in all sections. After the practical suspension of manufacturing at all the shops of the company for about two months the union workmen, without securing their demands, returned to work at all but the Chicago shops, where the output and its economical production are still somewhat impaired, although great progress has been made toward the re-establishment of the business of the company at this point on a proper basis.

"The construction of the new works at West Allis, near Milwaukee, Wis., has been under the personal supervision of Edwin Reynolds, the company's chief engineer, and has so far progressed that a large increase of manufacturing capacity will be available during the current year. The works as now being built will more than double the present capacity of the Allis Works at Milwaukee and will be noteworthy in their character, extent and facilities. The first unit of machine and erection shops has recently been put in operation, and when these works are completed they will employ from 3,000 to 4,000 mechanics and will be the most modern as well as one of the largest engine plants in the world.

"At the other plants of the company important additions of property and machinery have been made and are in course of construction and installation, with special reference to increase of output and decrease of cost of production.

"Notwithstanding the above-mentioned impediments to profitable operations, the net profits for the period ending April 30, 1902, after deducting liberal expenditures for maintaining and repairs, all corporation, general, patent and other expenses, and providing ample reserves for depreciation, bad and doubtful debts and incomplete contracts, amounted to $1,442,259.51; deducting four quarterly dividends of 1¾ percent (7 percent per annum) paid on the preferred stock, $1,137,500, there remains as the net surplus at the commencement of the second fiscal year $304,759.51. The company has no floating debt. It has cash in bank amounting to $4,514,167.05, and in addition in excess of current liabilities it has net current quick assets of $4,688,510.54; total cash and net cash assets, $9,202,677.59. The statement of profits and the condensed balance sheet are shown by the report of the comptroller hereto annexed. Orders unfinished and in hand April 30, 1902, $8,157,034.75; orders on hand and turned over to this company upon its commencement of business amounted to $5,665,882.13; gain in volume of business, $2,491,152.62. The amount of work available is much in excess of present facilities, and these will be gradually and largely increased during the present year as the new works at West Allis approach completion. We believe, therefore, the prospects of this company for the current year are most satisfactory."

*Paid May 1, 1902.

A strike of inside structural workers in Pittsburg was started Monday morning last, but was not as extensive as was expected. The men demand an increase from 38 to 40 cents an hour. About half the men on inside work at the plants of the Riter-Conley Mfg. Co., American Bridge Co., McClintic-Marshall Construction Co. and others in the Pittsburg district are now out.

The Lebanon Valley Iron Co., Lebanon, Pa., is being chartered to take over Lebanon Valley Furnace, a 60x13 mixed anthracite and coke stack, owned by the heirs of the late John Meily.

ST. LOUIS MACHINISTS' AGREEMENT.

It was a matter of comment at the April convention of the National Metal Trades Association at Cincinnati, when the reports from the different cities were read, that the St. Louis manufacturers were alone in dealing as a body with representatives of the International Association of Machinists. In that city, it appeared, the demands of the union as to hours and wages were granted, St. Louis being the only city in which a 54-hour week was the rule. On the other hand the St. Louis machinery manufacturers were able to secure what individual manufacturers who dealt with the union did not secure—a recognition of the abrogated New York agreement, particularly its provision for no interruption of work pending the consideration of labor questions, and its stipulations that there shall be no discrimination between union and non-union men, no limitation of output and that employers, while not interfering with labor unions will not tolerate interference with the management of their business. Recently a new agreement was adopted at St. Louis as the result of repeated conferences between the manufacturers and representatives of the union. It dates from May 20, though it was not ratified until after that date. The men secured the continuance of the 54-hour week, and an advance of 2½ percent, though they had asked for 12½ percent advance in wages. The agreement provides for the following shop rules, which the local lodges of the machinists' union endorsed.

No. 1.—A machinist is classified as a general workman, or a floor hand, or a lathe hand, or a vise hand, or a planer hand, or a shaper hand, or a milling machine hand, or a slotting machine hand, or a die sinker, or a boring mill hand, or a tool maker, or a linotype hand.

To be considered a machinist in either class, one shall be able to take any piece of work pertaining to his class, with the drawings or blue prints, and prosecute the work to a successful completion within a reasonable time. He shall also have served a regular apprenticeship or have worked at the trade four years.

It is understood that the question of competency is to be determined by the employers. Since the employers are responsible for the work turned out by their workmen they shall therefore have full discretion to designate the man they consider competent to perform the work and to determine the conditions under which it shall be prosecuted.

This last paragraph does not in any way abridge or destroy the right of appeal from any apparent or alleged unjust decision rendered by an employer, in conformity with the powers vested in him by this paragraph.

No. 2.—Fifty-four hours shall constitute a week's work. These hours shall be worked between 7 a. m. and 6 p. m., and a schedule thereof posted in the shops. All work outside of such schedule is to be paid for as overtime.

Night gangs shall also work fifty-four hours per week on the regular night schedule posted in the shop, and any overtime worked outside of the schedule hours shall be paid for as overtime.

(NOTE.—This rule is in no way to interfere with shops running under agreements providing a different schedule of hours.)

No. 3.—All overtime up to 12 o'clock, midnight, shall be paid for at the rate of time and one-half time, and that after 12 o'clock and the following holidays: New Year's Day, Fourth of July, Labor Day, Thanksgiving Day and Christmas and Sundays, shall be paid for at the rate of not less than double time.

In cases of emergencies, where shop machinery breaks or runs down, and it is absolutely necessary to repair the same so that the factory can run the following day, or on Monday, this work shall be paid for at the rate of time and one-half time. The repairs above referred to apply only to the machinery of the employer. The foregoing rates not to interfere in any way with existing conditions; that is, where a different rate than the above is paid now, no change will take place. Such rates for overtime shall not apply to men regularly employed on night gangs.

No. 4.—Apprentices shall be formally indentured for a period of four years to learn the machinist's trade, and at the time of making said indenture shall be between the ages of 16 and 21 years. There may be one apprentice for the shop, and in addition not more than one apprentice for every five machinists.

No apprentice shall, except for just cause, leave the service of his employer until he has served his full term, when he shall receive an apprenticeship certificate.

No. 5.—There shall be a fair day's wage, and no limitation of production.

No. 6.—We disclaim any wish to interfere with the proper functions of labor organizations, but will permit no interference with the proper management of our business.

No. 7.—Workmen shall belong or not belong to trades unions as they see fit. We shall employ union or free men at our discretion.

No. 8.—Any workman may leave our employment whenever he sees fit, and it is the privilege of the employer to discharge any workman when he sees fit. But this rule shall in no case permit collective action, contrary to the provisions of Rule 9.

No. 9.—We will receive committees of our employes to discuss grievances, and will not discriminate against any employe on such committee.

In case of misunderstanding we will meet our employes, either individually or collectively, and endeavor to adjust the matter on a fair and equitable basis, and in case of inability to reach a satisfactory conclusion we will submit the question to arbitration of six persons, three chosen by the employes and three by the employer, who shall, as soon as possible, attempt to adjust the matter, and in case of inability to reach a satisfactory conclusion this board may agree upon a final board of arbitration, whose decision shall be final and binding on both employer and employe.

Disapproving absolutely of strikes or lockouts, there shall be no cessation of work pending arbitration, and we will not arbitrate any question with men on strike.

No. 10.—There shall be an increase of 2½ percent in the hourly rates paid machinists.

No. 11.—These rules shall govern for one year from date hereof, and thereafter until amended or canceled.

The following are the members of the St. Louis Metal Trades Association, in whose shops the above rules will be effective the coming year: Wagner Electric Mfg. Co., Fulton Iron Works, Central Union Brass Co., Medart Patent Pulley Co., Curtis & Co. Mfg. Co., St. Louis Iron & Mach. Co., Quick Meal Stove Co., Kupferle Bros. Mfg. Co., M. F. Williams & Co., Kraushaar Lamp & R. Co., Hall & Brown W. W. M. Co., Yerkes & Finan W. W. M. Co., Standard Railway Equipment Co., N. O. Nelson Mfg. Co., Dehner-Wuerpel Mill Building Co., Seibel-Suessdorf C. & I. Mfg. Co., Fernholtz Brick Mach. Co., Schoellhorn-Albrecht Mach. Co., Wm. Ellison & Sons Mfg. Co., A. Leschen & Sons Rope Co., Barry Wehmiller Mach. Co., Remmers Pattern Co., Geo. J. Fritz F. & M. Co., Arthur Fritsch F. & M. Co., John Ramming Mach. Co., Whitman Agricultural Co., Essmueller Mill Furnishing Co., Moon Elevator Co., Leighton & Howard Iron Works, Chas. Sinning Mach. Co., Wm. Grundler Mach. Co., Fred. J. Swaine Mach. Co., Belleville Pump & Skein Works, John Kiburz Pattern Co., Fisher & Davis Machine Co., F. H. Meslage Pattern Co., Wm. Benson Pattern Co., O. Gaisler, Jr., Pattern Co., John C. Kupferle, Reliance Machine & Tool Works, St. Louis Motor Carriage Co., St. Louis Steam Engine Co.

T. J. Shaffer, president, and John Williams, secretary of the Amalgamated Association, attended the convention on Saturday of the new Eastern lodges of the Amalgamated Association. They reported that about 60 delegates were present at the convention, and that the association has gained about 1,200 members in the East. Assistant President John Pierce remained in the East in charge of the puddlers' strike in Central Pennsylvania which is in a fair way to be settled, as the Lebanon workers have been given the increase asked for.

At the McKees Rocks, Pa., machine shops of the P. & L. R. Railroad it was announced Tuesday morning last that the machinists would receive an advance to a uniform rate of $2.75 per day, the increase dating back to May 1, so that the men will receive the increased rate when they get their monthly pay June 7.

The New West Allis Plant of the Allis-Chalmers Co.

The great shops of the Allis-Chalmers Co. are rapidly approaching advanced stages of completion at West Allis, Milwaukee, Wis., and *The Iron Trade Review* has the pleasure of presenting a comprehensive and authoritative account of the design of this mammoth hive of the machine industry. The designing of these shops has been entirely under the direction of Edwin Reynolds, chief engineer of the Allis-Chalmers Co., of whom a biographical sketch and portrait was published in the Engineering special number of *The Iron Trade Review*, Nov. 14, 1901. Since that time he has been elected president of the American Society of Mechanical Engineers.

In the building of the present Allis works great difficulty has always been experienced in adapting the buildings to the available ground and it has invariably been necessary to arrange the system of transferring the material through the plant to conform to the shape of the shop structures. This construction has often made it necessary to handle material several times, whereas if the buildings could have been laid out as desired and entirely irrespective of the configuration of the land, it would have been necessary to handle it only once. Mr. Reynolds said, when the question came up of building the new shops, that he was tired of building shops to fit real estate, and that he proposed to lay out a plan just as he wanted it and would then have the site selected to suit the plan.

This determination was not altered by any subsequent resolutions and the present location is in accordance with the chief engineer's requirements. The site is about four miles west of the present Edward P. Allis shops, and southwest of the center of the city of Milwaukee. The land lies between the Chicago, Milwaukee & St. Paul and the Chicago & Northwestern railway tracks, and is reached by a spur from each main line. The tract of land is about one-quarter of a mile wide by one-half mile long. The ground was selected in this shape to suit the layout of the buildings and to provide for future extensions. At the present time about one-half of the projected plant is ordered. The plant when completed will consist of pattern shops, foundry, machine and blacksmith shops, erecting shop, offices, store houses and power house. These are shown in the accompanying engravings. Fig. 1 represents the finished plant, or rather that portion of it which is to be first put into working operation. Fig. 2 is a plan of the site and the buildings as in course of construction. Fig. 3 is a plan of the power house, electric equipment and coal storage. Fig. 4 is a sectional elevation through the boiler room and the stack. The drawings are freely dimensioned and the distances and other similar data need not be repeated in the text of this article as they are so completely shown in the engravings. It will be seen that the plan is laid out as follows: Starting at the southwest corner of the tract of land is the office building and proceeding north along the edge of the property will lie the pattern shop and pattern storage house. A little further to the east, and running parallel to the pattern shop, will be the foundry. In a line parallel to the pattern shop and foundry, but at a distance of about 700 feet from them, will be the erecting shop, and east of the erecting shop will lie the storage yards and switching tracks for the railroad cars.

FIG. 1.—THE NEW ALLIS-CHALMERS PLANT AT WEST ALLIS, MILWAUKEE, WIS.

The machine shops are located between the erecting shop and the foundry but in a direction at right angles to them. These machine shop units start at the south end of the property and are in line with the foundry and erecting shops and lie spaced at regular intervals extending towards the north.

The general method of the design has been to have the area of the foundry and pattern shop, or as much of these as would be placed opposite each machine shop unit, properly proportioned to produce as many patterns and rough castings as the one section of machine shop would be able to handle. Similarly, the area of the erecting shop, opposite the other units, has been proportioned to erect as much material as each machine shop would produce. One blacksmith shop is intended to serve four machine shop units and is therefore located centrally in relation to them. As the shops are further extended, and four new machine shop units are added, a second blacksmith shop will be built, in the same relation to its machine shops as the first one.

It will be evident that the plant can be indefinitely extended to the limits of the property in this manner. In the event that it is found that the capacity of the pattern shop is insufficient as built to supply the necessary patterns, additional area may be given to the pattern shop which will produce the required capacity; the same being true of the foundry, machine shops and the erecting shop.

The system involved in this construction gives an additional advantage in the convenience with which extensions may be made. In case it were desirable to increase the capacity of the erecting shop, for example, the new length would be built and completed before tearing down the limit wall of the previously existing shop, so that there would not be a moment's interruption of the shop work on account of the new erection, nor in fact any interference with the normal functions of the manufacturing plant. Should a new machine shop be required, it would simply be put down alongside of the existing shops without interference, as it would be entirely outside of the working area.

Material coming in through the works will enter at the west side of the plant, iron and supplies going into the west side of the foundry, and wood, etc., into the pattern shop; each being unloaded directly from the cars at their proper places. Castings when completed will be taken from the foundry directly into the machine shop where they are to be worked up, and the machines in the machine shops will be arranged as far as possible so that the progress of the castings will be in one direction through the shop toward the erecting department, going from machine to machine as required until finished and delivered under the crane to be finally erected.

Between the machine shops are traveling cranes to handle the material which it is intended to store. Tracks connect the foundry and machine shops so that castings can be transferred directly from foundry into machine shops and tracks from the erecting shop are provided to take away machines which have been boxed for shipment. Beside the tracks between the foundry and the machine shops will also be provided electric cranes and through the foundry, machine shops and erecting department will also be electric cranes. The general dimensions of the shops and yards are given on the plans and these determine the span of the cranes. The remainder of the data is as follows: Shop No. 1, which includes one machine shop with its section of erecting department, will be equipped with four 10-ton, two 40-ton, one 25-ton, and one 75-ton cranes.

Shop No. 2, including one machine shop and its corresponding section of erecting shop, will have two 40-ton, one 25-ton, two 20-ton with 5-ton auxiliaries, one 30-ton with 7½-ton auxiliaries, and four 5-ton cranes.

Shop No. 3, including one blacksmith shop, engine room and section of the erecting shop, will have one 20-ton crane with 5-ton auxiliary, one 10-ton, three 5-ton, and one 15-ton hand traveling crane for the engine room.

The foundry will have two 40-ton cranes with 10-ton auxiliaries, one 60-ton with 15-ton auxiliary, four 20-ton with 5-ton auxiliaries, one 30-ton with 7½-ton auxiliaries, one 2½-ton wall crane and two 6-ton wall cranes. The yards will have two 40-ton cranes and one 10-ton high speed crane.

Water for the plant will be obtained both from the city water works system of Milwaukee and also from driven wells on the property and a complete sewage disposal plant will be installed on the septic tank system. The Evans-Almirall hot water system of exhaust heating has been decided upon for the new plant. Each department will have a wash room, fully equipped with expanded metal lockers, one for every man; wash basins and sanitary closets.

There will be a separate building for the hospital, in which there will be a waiting room, operating room, and a ward with other necessary rooms, to make up a first class emergency hospital. A dining room has been under consideration but this is a matter of some magnitude and while the subject is still under advisement nothing in that respect has been definitely settled.

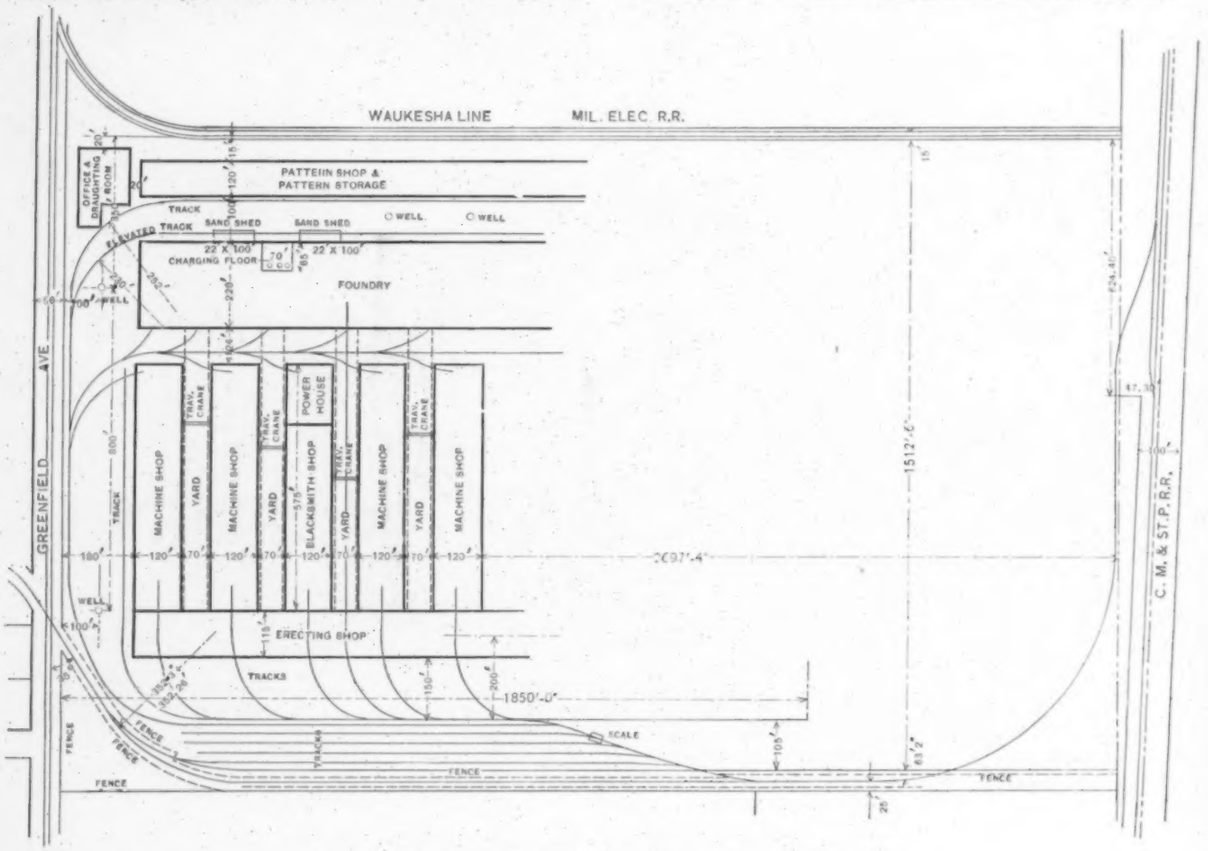


FIG. 2.—PLAN OF BUILDINGS AND LAND OF THE WEST ALLIS WORKS.

The Huber Mfg. Co., of Marion, O., manufacturer of engines and threshers, has now 500 men at work in its various departments—foundry, chipping and cleaning, machine shop, vise room, assembling and erecting, wood-working and painting departments. The company uses the piece-work system in its machine department, in other departments the day rate only.

Concerning the Advertising of Machinery.

To the Editor:

There is a well known maxim to the effect that the cobbler should stick to his last, which is after all but one way of telling a man to mind his own business; and the individual who assumes to travel outside the ruts of the beaten track of his chosen avocation may expect, if indeed he does not richly deserve, a reminder strongly akin to this. Even then, one may be forgiven for placing on paper a few impressions suggested in looking through the advertising columns of the trade journals; for while I lay no claim whatever to being an expert in the art of advertising, I do have some acquaintance with the construction and sale of machinery, and advertising, as I understand it, is pure and simply a means whereby the prospective buyer learns of the article offered for sale.

But to make it still more effective such improvements as experience may suggest must from time to time be introduced. An advertisement is the more effective where it seems to stand out from its fellows on the printed page and not only arrest the attention of the reader but actually shout the message of the advertiser. Where, however, all receive the same care in construction and presentation, this opportunity to make the surrounding advertisements appear as foils or frames to the one particularly favored, is lost; and in a crowd, where all are at once shouting for attention, each individual has the same chance as his fellows for especial notice.

This naturally leads to the point where the advertisement will make more efficient use of the valuable space it occupies by employing an even better description of the goods. It will go into details and if the space is only large enough to state one fact that answer will reply to the most likely question the possible buyer would be prone to propound.

General advertising may serve for a long established business. It compares with the sending out of a dumb representative to leave a card with those upon whom he calls; it does no more than tell the trade "we still exist."

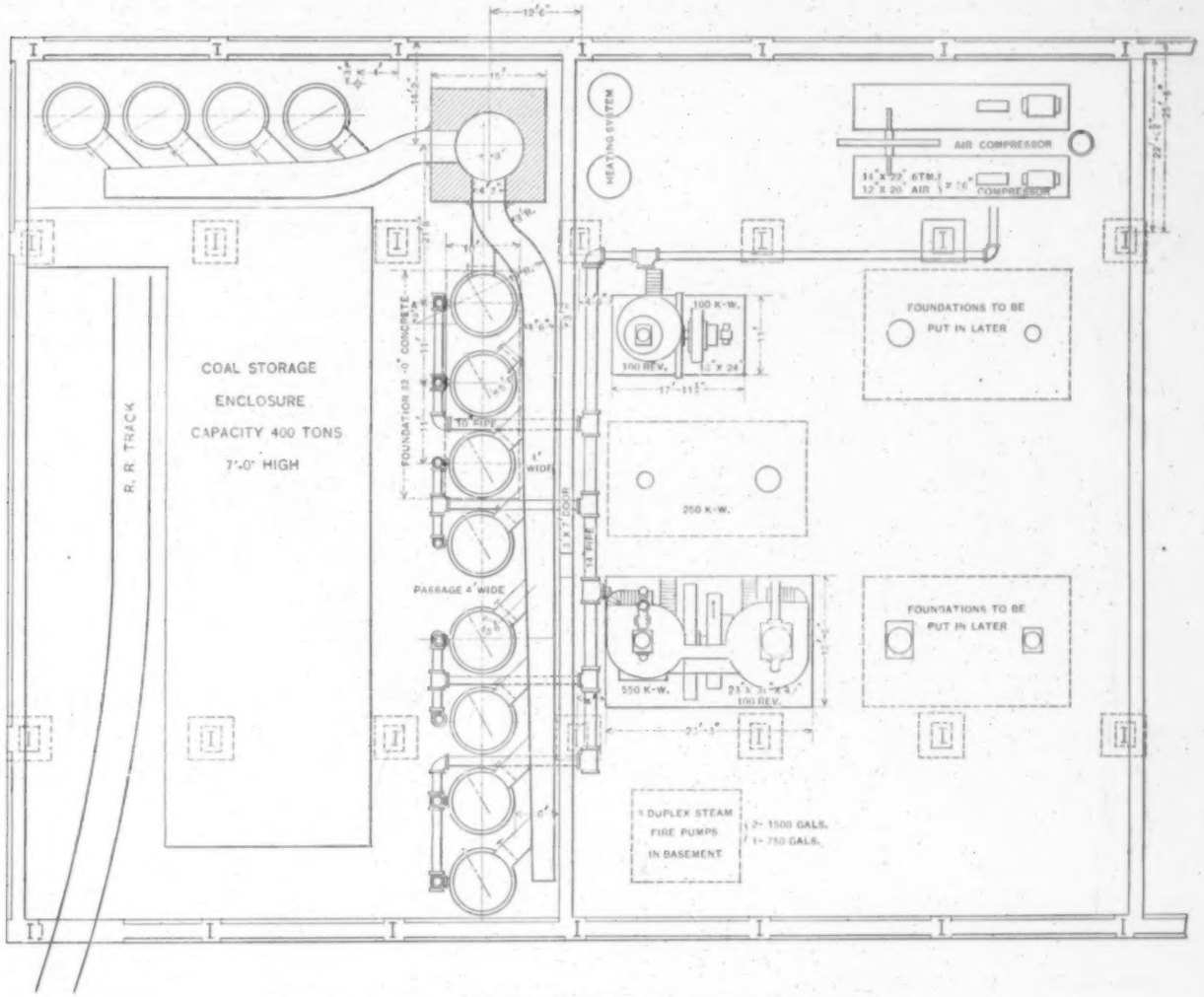


FIG. 3.—PLAN OF POWER HOUSE, ELECTRIC EQUIPMENT AND COAL STORAGE.

Of course there is advertising and advertising—schemes of all sorts and conditions. However, one need not go into the description of seductive chromos and other similar inducements to business acquaintance, but confine the inquiry to such advertising as is shown in the columns of the trade journals. There is ample variety and one who like myself has followed the machinery trade for many years cannot but be surprised at the contrast between the advertising of those earlier years and these latter days.

How the number of advertisers has grown and multiplied. The type-dress has improved and kept step with the modern pace; the arrangement of the letterpress and the artistic presentation in attractive and vigorous style of the advertisements, have progressed at a remarkable rate.

It must bring results or it would not be steadily maintained year in and year out. That I think is conceded by every one.

I visited an office recently where the proprietor had just decided to insert an advertisement in a technical publication. He simply handed over his business card as suitable "copy" for some time to come. It was not the most original way in which to draw attention to his product; but after all it seems to compare favorably with the succession of bald statements that are often included in an advertisement and which are little more than meaningless.

The ideal advertisement ought to be filled with information, and to say that "we make the best by modern methods with unique and useful features" conveys little to the man who deals with dimensions.

I take it for granted that every manufacturer knows some

plausible reason why his product excels, and I am very sure that in actual every-day business he would not hesitate a second in explaining that feature in unmistakable terms. I remember a gentleman once stating that he designed his machines with such a margin of strength that the tools could be broken down and destroyed and not otherwise put the machine out of service. I cannot say how accurate this statement may be, but it could form the foundation for an advertisement that would mean something more than vague generalities.

The printed advertisement is a salesman capable of talking to more thousands than any salesman on two legs can get at individuals in the same time. And the advertisement stays at the job as long as there is anything else in the paper worth preserving. It is never under the weather, keeps good hours and appointments, and waits your leisure patiently. Like the human salesman it should be well dressed in attractive type: should tell what can be, or has been, done with that particular machine or appliance; should speak of extreme limits so that a reader will not write you for something larger or smaller than you care to make;; and such data as would be required by the average buyer.

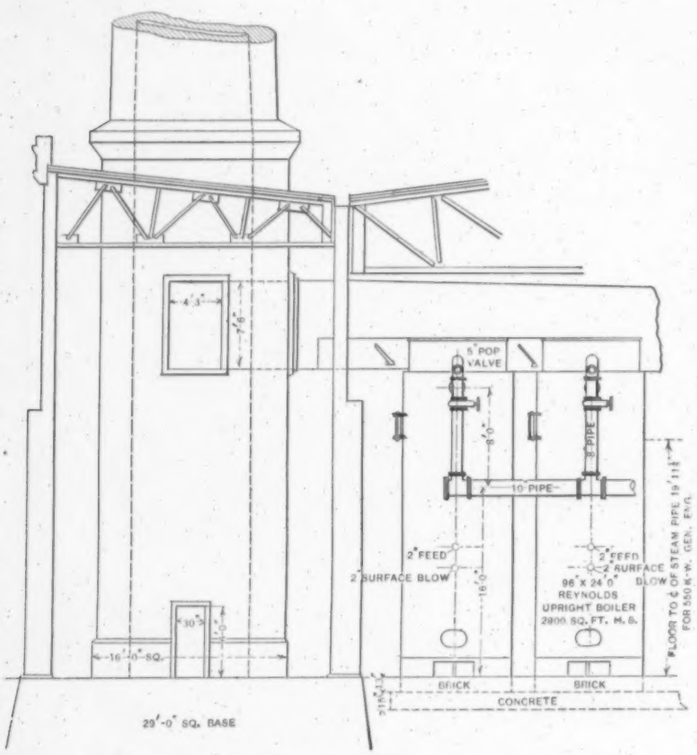


FIG. 4.—SECTIONAL ELEVATION THROUGH BOILER ROOM AND STACK.

The human representative can never be entirely substituted for the printed advertisement or vice versa. Each has its proper sphere of activity; but the two are very nearly akin and the things that make a success of the one should be applied to the other so far as they are at all applicable, and I am quite positive that no aggressive, successful salesman indulges in the indefinite utterances characteristic of many advertisements.

The advertisement can, and should, give an idea of the price and capacity of the goods; and the up-to-date engraver can help wonderfully in the portrayal of many features impossible to describe in cold type in the same amount of space. The plan of showing a shaft, or anything else, turned, ground or subjected to any other process, along with the account of the time taken to do that particular job, furnishes a basis for ready comparison with the work you are already doing, and although this cannot be an exact method it nevertheless conveys definite information.

There is a curious difference in the way in which a man will advertise for a machine, and the manner in which the selfsame individual will advertise a machine he is manufacturing. In the one case he knows definitely just what he wants and states the need in unmistakable style. In the other, he would consider it an insult to insinuate that he was not equally well acquainted with his product but very often the advertisement reads as though it had been concocted from hearsay rather than actual expert knowledge. There is a difference, to be sure, in appealing to the one individual and the many; but admitting this requirement the aim should be directed toward having the advertisement tell a plain tale to practical men in a noticeable way, and this seems to me the very gist of advertising.

Lots of the smaller manufacturers have a keen desire to find out just how far the papers contribute to their business. They see the large concerns, whose names are familiar to shopmen all over the world, throwing their money freely into the advertising department of the trade journals and wonder at the oversight or suppose that it is a disregard for results and maybe an unnecessary desire to prove that they are still in the game. As a matter of fact the advertising of these large firms is handled by men who are as close buyers as any one in the other purchasing departments. They strain every nerve to build an advertisement so that it will hold results in good measure and then they go gunning for the printer until he frames it to suit their taste. Are they doing this for fun? Nay.

The man who has not gone into the subject looks upon advertising from two points of view: either he is too well off to need it or times are too hard for him to bear the burden. The selling expense, and this includes judicious advertising, I consider as essential a part of the general expense account as the fund required for new equipment or the repair of the old appliances. Advertising is the lubricant of the sales mechanism and it is just as necessary that it be freely applied in that department as that oil should be used in the manufacturing end of the business. If it fails to bring the desired results there is something wrong about the grade of the lubricant or it is not directed at the best point of application. Poor oil is a nuisance when applied to a shaft bearing and good oil is absolutely useless when it is put on the shaft between the hangers.

The medium that reaches the buyers is the only one available. The journal should be prepared for just the class you wish to buy your goods. Does it profit a man to mix up his machine tool advertisements with the frippery of other trades? I think not. It is simply so much shelling the woods. But the live advertising, a well displayed account of something really worth having, in the columns of a journal directed at the men you seek to interest, has the target in sight and the shot goes with all the momentum of the value that the reading matter has to the subscribers.

A word about the "keying" of advertisements. It is a doubtful expedient at best. It means the embodiment of some letter, numeral or word, in the phraseology, usually in the address or the reference to the catalogue, circular or machine. Does the reader of the advertisement charge his memory with these things? The individual reader may try to call to mind any of these and while he may remember that such customs exist, he will have some difficulty in remembering the "key" of any of them. The advertisement has largely done its duty if it gives a lasting impression that a certain firm makes a machine and conveys a favorable idea of the manufacturer or his product. The every-day business man does not consume time in saying where he read the advertisement. Life is too short for the unnecessary and his correspondence is already shorn of any of the embellishments the epistolary art may have had in the polite intercourse of many years ago. He is apt to think a firm cuts a diminutive figure in the world if it is necessary to address them at a specified letter box or street number. He may be punctilious in these things if he uses these devices in his own advertisements—if he be an advertiser—but I will say concerning my own experience that the breach has been as frequent as the observance.

He may think it best to state his needs frankly and having done that, why refer to "Catalogue U 3" or some other invention? Any keying device is destined to go astray when it puts any obstacle in the way of the reader reaching the advertiser with the minimum amount of trouble. It may seem a small amount of extra labor to look up the advertisement and prepare the letter exactly in accordance with the wishes of the adsmith but human nature is not to be expected to hew so closely to the line. Nor is it to be cajoled beyond a certain stage; and the ad-maker who drafts his productions so that they will reach the fruit in the orchard of business need not worry over the additional length to splice on the rod. If his advertising brings inquiries from people who have the money and can be made to feel a need for the machinery as exploited in print, then the advertiser may be sure his pole is long enough to get a good share of the persimmons.

The small firm that has all the work it can handle in good times does not intend as a rule to go out of business in bad years. And now as my friend, the advertising solicitor, suggests: The advertisement is a continuous affidavit that business is being done and that arrangements are perpetually under way to handle more of it. The rapidity with which the memory drops the name of a business house that fails to keep busy is an argument for the repetition of the reminder by a perpetual performance of the advertisement. The impression is thereby maintained during good times and when trade is not so vigorous the aftermath of that publicity campaign will sustain the shop momentum. JOHN DRUMMOND.

ENGLISH SECTIONS OF STRUCTURAL SHAPES.

John Needham & Sons, of Manchester, Eng., have issued an abridged size sheet of structural material, indicating some of the ordinary sections of beams, also special widths of flange beams weighing up to 177 pounds to the foot, in addition to sizes of angles, channels, tees, etc. It is interesting just now as indicating the variation between foreign-made shapes, of which some imports have been arranged for, and the standard American sections. The table of ordinary sizes of beams as shown in the above sheet is as follows:

Sections in Inches.		Weight in Pounds per Foot.	
Minimum.	Maximum.	Minimum.	Maximum.
3 by 3	3 by 3 7/16	8.00	10.39
3 1/8 " 1 5/8		3.97	
4 " 2		5.56	
4 " 3	4 " 3 7/16	9.00	12.19
4 1/4 " 1 3/4	4 1/4 " 1 15/16	5 88	9.68
4 1/4 " 2 1/4		7.46	
5 " 3	5 " 3 7/16	9.74	13.74
5 " 4 1/2	5 " 4 3/4	17.00	21.00
5 1/2 " 1 3/8	5 1/2 " 2 3/16	7.06	11.49
5 7/16 " 3 5/16	5 7/16 " 3 7/16	12.43	13.57
6 " 3		11.00	16.37
6 " 5	6 " 5 1/4	22.0	26 8
6 1/4 " 2	6 1/4 " 2	8.4	13.44
7 " 3 1/2	7 " 3	14.5	20.1
7 " 4	7 " 4 1/4	15.5	21.1
7 1/16 " 2 3/16	7 1/16 " 2 5/16	10.08	15 79
7 7/8 " 2 3/8	7 7/8 " 2 15/16	11.76	18.08
8 " 4	8 " 4 1/4	17.9	24 3
8 " 5	8 " 5 1/4	23.00	29.4
8 " 6	8 " 6 7/16	29.00	35 4
8 1/4 " 2 7/16	8 1/4 " 2 15/16	13.78	20.7
9 " 4		22.4	
9 " 7	9 " 7 1/16	51.0	59.0
10 " 4 1/2	10 " 4 15/16	25.0	33.0
10 " 5	10 " 5 1/4	26.4	34.4
10 " 6	10 " 6 7/16	38.0	45.0
11 1/16 " 4 15/16	11 1/16 " 5 1/16	36.15	40.89
12 " 6	12 " 6 7/16	40.0	49.6
14 1/16 " 5 5/16		50.87	
14 " 6	14 " 6 7/16	47.0	58.2
15 " 5		40.0	52.0
15 " 5 5/16		56.05	
15 1/4 " 6 1/8		61.7	
17 1/4 " 6 1/4		77.3	
19 1/4 " 7 1/4		94.1	

The following data concerning variations and extras, as given by this English firm are interesting:

Weights and sections stated are approximate and subject to a rolling margin of 6 percent more or less. For large specifications, however, of any one section a greater exactness can be guaranteed.

Basis lengths 39 3/8 inches to 40 feet long.

Extras for lengths over 40 feet: Sections up to 15 3/4 inches high, 2s. per ton, per meter (39 3/8 inches) or fraction. Sections over 15 3/4 inches high, 4s. per ton per meter (39 3/8 inches) or fraction.

Extras for short lengths on all sizes from 19 3/4 inches to 39 3/8 inches, 5s. per ton.

Cutting to exact lengths with an allowance of 10 mm. (25/64 inch full) either way, 2s. 6d. per ton.

Cutting to exact length with an allowance of 3 mm. (1/8 inch bare) either way, 5s. per ton.

Extra for painting all sections, each coat of paint, 2s. 6d. per ton.

Extra for punching round holes in webs, 1d. each, in flanges 2d. each.

Extra for punching oval holes in webs, 2d. each, in flanges 4d. each.

Extras for section-beams, 12 5/8 to 15 3/4 inches high, 3s. per ton.

Extras for section-beams, 16 3/4 to 19 5/8 inches high, 6s. per ton.

Extras for section-beams, 9 by 7 inches, 6s. per ton.

For special wide flange beams the following specifications are given:

Depth in Inches.	Width of Flanges in Inches.	Thickness of Web.	Weight per Foot in Lbs.
9 1/16	9 7/16	7/16	51.1
9 7/16	9 1/16	7/16	55.4
10 1/4	10 1/8	1/2	61.0
10 5/8	10 5/8	1/2	65.0
11 1/16	11 1/16	1/2	69.5
11 7/16	11 7/16	1/2	74.5
11 7/16	11 7/16	5/8	80.23
12 1/16	11 7/16	5/8	84.8
13 1/4	11 7/16	5/8	88.3
14 1/16	11 7/16	3/4	95.8
14 1/16	11 7/16	3/4	100.85
15 1/4	11 7/16	3/4	107.39
16 1/4	11 7/16	7/8	112.83
17 1/16	11 7/16	7/8	120.96
18 1/16	11 7/16	7/8	127.68
19 1/16	11 7/16	1	138.1
21 1/16	11 7/16	1	152.0
25 1/16	11 7/16	1	165.9
29 1/16	11 7/16	1	177.0

At the annual meeting of the William Cramp Ship & Engine Building Co., at Philadelphia, directors were re-elected as follows: Charles H. Cramp, Thomas Dolan, Clement A. Griscom, Henry Seligman, William H. Barnes, Samuel Dickson, Morton McMichael, Edwin S. Cramp and Francis L. Potts. Charles H. Cramp was re-elected president, Edwin S. Cramp, vice president, and Charles T. Taylor, secretary and treasurer. It was voted to issue $4,000,000 mortgage bonds, for the purpose of taking up a previous bond issue of $1,500,000, to meet the expense of recent improvements to the property and to provide working capital. The gross earnings for the year were $8,202,000, and the net earnings $611,000, out of which dividends and interest amounting to $466,666 were paid. Mortgages were reduced $95,000. The company has unfinished work in hand amounting to $12,811,000.

The John B. Lang Engine Works, of Ithaca, N. Y., were established in 1865, and in the intervening years the enterprise has made steady progress until today the Lang traction engine is known throughout the country, as well as in Canada and Mexico and some of the South American republics. The plant is working to its utmost capacity, and it is stated that in over 35 years the works have not closed down for a day because of lack of orders. The claims of durability, simplicity and economy in management are made prominent by the manufacturers.

The Allis-Chalmers Co. has placed an order with the Pittsburg Gauge & Supply Co., of Pittsburg, for a complete White Star filtering system to be applied to two of its engines destined for improvements in the plant of Jones & Laughlins Ltd., of Pittsburg.

Cost Keeping and Wage Systems of the Stilwell-Bierce & Smith-Vaile Co.

The Stilwell-Bierce & Smith-Vaile Co., of Dayton, O., manufactures about as varied a collection of machinery as may be found in a trip of considerable length. Oil mills for the treatment of cotton seed, linseed and corn, air compressors, pumping machinery, filter presses, digesters, feed water heaters and purifiers and turbine water wheels, are among the list and when it is considered that the work of manufacturing these goods is carried on at three shops in different sections of Dayton, it will be seen that the difficulties in the way of a thoroughly uniform and convenient system of handling the business are unavoidable under present conditions.

This has been realized to the full and the management have decided upon a consolidation of the shops with improved manufacturing facilities and adequate equipment for the work which is every year becoming heavier and more exacting. At present little can be said of the plans for the future or even the system which is in use, as the changed conditions will necessitate many important alterations in previously established methods. A new cost system, for example, has just been adopted at the East shops, which work in conjunction with the bookkeeping system has scarcely been long enough in operation to be complete in all its details. In other words, there are more or less changes and modifications going on and these will continue for some little time until the innovations have definitely established a right to a permanent place in the shop economy.

Recently the premium system of wage-earning has been introduced and it is highly endorsed by such of the men with whom the writer had an opportunity to come in contact. It has been found that the experience of the shop in accurately determining piecework rates has enabled the men in charge of the shop records to prepare the premium percentage on the basis of an equal distribution of the time saved between the workman and the employer. The writer ventured to point out the difference between the incentive derived from a freely operating measure like the premium system and the very limited encouragement given by a piecework rate which normally administered a punishment whenever the workman became too energetic and skillful in comparison with the fixed amount considered as a sufficient labor remuneration by the office. In reply, attention was directed to the thoroughly systematized manner in which costs has been maintained for years; and it was pointed out that a careful study of the shop equipment had been continued during that time; that the men who had

SYMBOLS OF MATERIAL.

	Cast Iron	000	Steel Castings
0	Malleable Iron	0000	Machine Steel
0	Wrought Iron	000	Spring Steel
00	Brass	000	Tool Steel
00	Rawhide or Leather	⊗	Mushet Steel

SYMBOLS OF WORK.

⊖	Bore	○	Rough
|	Plane	○–	Turn
—	Face	⊜	Seat Drill Tap and Drive
V	Drill	⊘	Tap for Stuffing-Boxes
⋙	Pipe Tap	◎	Drive " "
>	Center	≈	Chase
◡	Counter Sink	=	Vise Work
S	Cut Off	X	Forge
P	Polish	□	Complete
		⦚	Tap for Stud

FIG. 1.—MATERIAL AND OPERATION SYMBOLS.

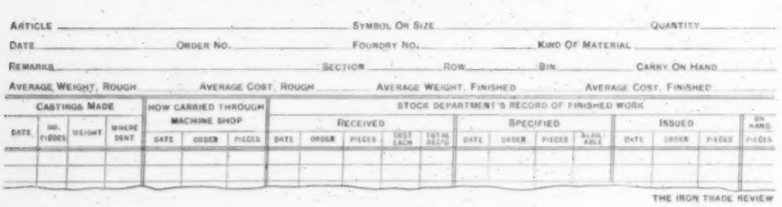


FIG. 4.—STOCK INDEX.

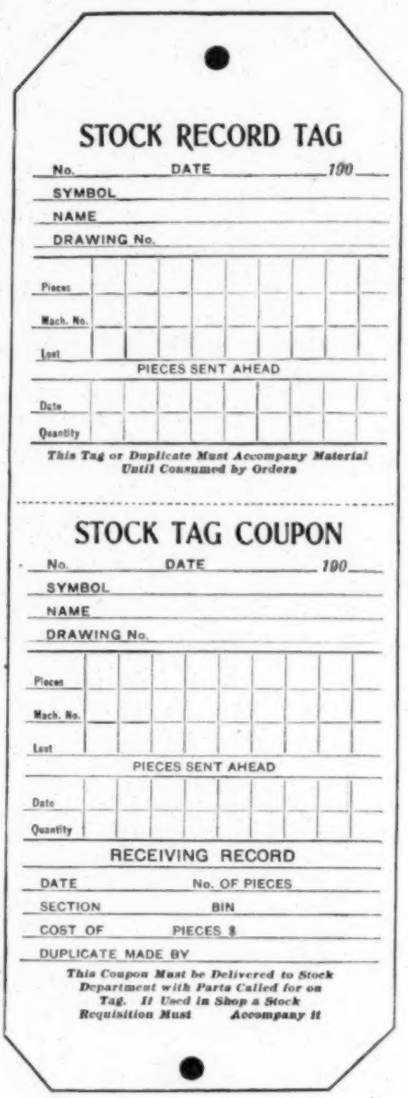


FIG. 5.—STOCK RECORD AND COUPON.

in charge the present improvements were not only well posted mechanics but had had the same shop work in hand for a number of years and their judgment of men and machinery was presumably adequate in connection with the store of labor and cost records to permit the 50 percent basis decided upon as an equitable arrangement. Further than this contention is the very obvious one in regard to the probable attitude of the men in the shop. An ordinary experience with piecework methods and results leads to a fairly well grounded fear that the scheme is but a test to ascertain the individual ability of the workman so that later he may be cut down in wages. With the aid of this painfully acquired knowledge the workman is likely to look upon the premium system as a thinly disguised measure of the same order and his natural, even if incorrect, prejudice is not likely to be lessened when he learns that the lion's share of the actual gain in his productive efforts is to be taken by the employer.

On the other hand, an even division of the gain is presumptive proof of good intentions, and the equity of the newly introduced method becomes more apparent to the shop sense of the workman.

The sympathy of the workman with any system is essential to its maintenance for any length of time. Certainly the success of any novel feature in the shop management demands the cordial good will and appreciative co-operation of all concerned and along this line the success of the system will be watched with great interest by those fortunate enough to keep in touch with the course of events in the widely separated shops of the Stilwell-Bierce & Smith-Vaile Co. Hearty co-operation is not lacking by any means and it is found that the men are ready to suggest improvements in machinery as well as better methods of production generally. The idea being quite patent that the shop force is not a divided organization but that the new system stands for unity and that in the furtherance of united effort it is eminently appropriate that the workman shall give suggestions fully as freely as that the management shall provide the means to make them effective. This is carrying the 50 percent policy to its legitimate con-

THE STILWELL-BIERCE & SMITH-VAILE CO. W. S.

MACHINE SHOP.

*Order No.*_____ *Print No.*_____ *Pattern No.*_____ *Date*_____

*Name of Workman*_____ *On Machine No.*_____

NO. OF PIECES.	DESCRIPTION.	OPERATION.	TO BE FILLED IN BY TIME-KEEPER. HRS.	RATE	AMOUNT.

STARTED NEW.	CONTINUED.	UNFINISHED.	FINISHED.

	DAY.													NIGHT.										
COMMENCE		15			30			45						15			30			45				
Monday	6½	7	8	9	10	11	12	1	2	3	4	5	5½	5½	6	7	8	9	10	11	12	1	2	3	4	5	5½	6
Tuesday	6½	7	8	9	10	11	12	1	2	3	4	5	5½	5½	6	7	8	9	10	11	12	1	2	3	4	5	5½	6
Wed'sday	6½	7	8	9	10	11	12	1	2	3	4	5	5½	5½	6	7	8	9	10	11	12	1	2	3	4	5	5½	6
Thursday	6½	7	8	9	10	11	12	1	2	3	4	5	5½	5½	6	7	8	9	10	11	12	1	2	3	4	5	5½	6
Friday	6½	7	8	9	10	11	12	1	2	3	4	5	5½	5½	6	7	8	9	10	11	12	1	2	3	4	5	5½	6
Saturday	6½	7	8	9	10	11	12	1	2	3	4	5	5½	5½	6	7	8	9	10	11	12	1	2	3	4	5	5½	6
FINISH		15			30			45						15			30			45				

FIG. 2.—MACHINIST'S TIME CARD.

ORDER ON SMITH SHOP

Date

No. of Pieces	*Symbol*	*Name of Article*	*Order No.*
Check No.	*Name of Employee*	*Mach. No.* / *Operation*	*Lot No.*

Pieces Lost | *Rate P. W.* | *Remarks*

Date	6. 5.30	6.30	7. 7.30	8. 8.30	9. 9.30	10. 10.30	11. 11.30	12. 12.30	1. 1.30	2. 2.30	3. 3.30	4. 4.30	5. 5.30	6.	*Total Hrs.*

SMITH SHOP

STOCK RECORD

Order No.

Lot No.

STUB OF FINAL OPERATION MUST ACCOMPANY PIECES TO STOCK DEPT.

Date

No. Pieces

Symbol

Name

Drawing No.

MATERIAL

Kind Used

Size Used

Weight

MATERIAL

Kind Used

Size Used

Weight

MATERIAL

Kind Used

Size Used

Weight

FIG. 3.—TIME CARD AND STOCK RECORD.

clusion, an even division of the burden, and so long as this spirit is significant of the shop feeling no one would be likely to offer criticism of the rate, though this is the most important feature in the problems incident to the introduction of the premium plan and the proper settlement is of the highest degree of importance.

Several instances of the co-operation of the workmen were cited in a recent trip through the plant. One of these in particular attracted the attention of the writer. It was a rough and ready attachment to a gear planer and consisted of an arm, a sliding weight and a strip of belt lacing. The machine was in full operation at the time of the writer's visit and it was difficult to get thoroughly at the exact mission which the device was intended to fulfil, but inquiry brought the information that the operator had rigged up the appliance for a more convenient method of adjusting the rate of feed to the depth of the cut; that when the tool was taking a thin chip the rate of feed was increased so that the work was uniform at different stages of the process of tooth generation. In this instance the workman had gone ahead with the innovation, improvising it from material easily obtained in the shop, and was improving the output and thereby increasing the general machine efficiency of the plant.

A quiet suggestion by the writer in regard to a recently introduced improvement in a certain machine was at once noted by the man in charge who saw the point instantly and announced his intention of having the device. This is intelligent zeal of a high order and a shop supplied with this type of men and methods cannot be other than prosperous.

A very general use of symbols for parts of machines, diameters and strokes of cylinders, etc., has been in vogue for many years. The arrangement is, of course, purely conventional in type and in some respects does not have unusual features as compared with devices for the same purpose in use elsewhere. The method as carried out to the extent of designating the material and operations to be performed on any piece of work is somewhat peculiar to the plant so far as the experience of the writer goes and is here illustrated in Fig. 1. The symbols and their equivalents are clearly shown and tell the story of their shorthand usefulness in detail.

Figs. 2 and 3 are time cards from different shops and are introduced to show two methods of figuring time. The idea in each case is to require the least amount of clerical work and yet have a full record of all matters relative to the work in progress. In Fig. 2 the time is kept to the nearest quarter hour by striking the pencil through the appropriate figures in the columns of hours and minutes, to show the time when the work commenced and stopped, for any day in the week and of course any time in the twenty-four hours. In fig. 3 a "check" mark or "arrow head" is employed for a like purpose. The two "checks" on the form signify that on the morning of that day the time from 7 to 11:45 was devoted to a certain piece of work.

THE STILWELL-BIERCE & SMITH-VAILE CO.

COST DEPARTMENT

Order No. _____

MATERIAL				TURNING			PLANING			BORING			DRILLING									MACHINE		COST	FLOOR WORK	
Cast Iron	Brass	W't Iron	Cost	Ma.	Hr.	Cost	Ma.	Hr.	Cost	Ma.	Hr.	Cost	Ma.	Hr.	Cost	Ma.	Hr.	Cost				Hr.	Cost		Hr.	Cost

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FIG. 6.—SPECIFIC LABOR AND MATERIAL COSTS SHEET.

The Figs. 4 and 5 are employed in keeping track of the work done on various jobs. Fig. 4 is a complete record card, 3¼x6 inches, of the cost, condition and location of the different pieces together with the dates, weights, etc. Fig. 5 is in two halves which are separated, the one held by stock department while the other follows the material in its travels through the shop. Suitable provision is made for the entry of the name of the clerk responsible for the duplicate entry. At the completion of the work the cost sheets, Figs. 6 and 7, will give in detail the expense, quantity of material and cost of labor, etc., properly itemized.

THE STILWELL-BIE

COST D

Date

	CAST IRON		WROUGHT IRON		LEAD		BABBITT		STEEL PLATE		WOOD SHOP LUMBER		PATTERN SHOP LUMBER	
	WEIGHT	COST	WEIGHT	COST	WEIGHT	COST	WEIGHT	COST	WEIGHT	COST	FEET	COST	FEET	COST

THE IRON TRADE REVIEW

FIG. 7.—GENERAL SUMMARY OF COST

The purchasing system of the company has been designed by Mr. Chas. W. Haas, the agent in charge of that department. It has been thoroughly described in recent issues of *System* and in the following data the writer has condensed the information obtained from a personal inspection of the system with the aid of the article in question. In the regular course of manufacture orders are placed with the shop superintendents and on receipt of requisitions from them by the stock department, other requisitions for missing material to fill orders are made out and forwarded to the purchasing agent. The different shops, foundry and office, have various colors for their respective forms as well as separate order numbers for ready reference. An accurate description of the desired material, together with the quantity, is signed by the storekeeper and approved by the superintendent. At the bottom of the form is a memorandum slip. This is filled out by the purchasing department and returned to person issuing the requisition. The slip gives the date when order was received by the purchasing agent and the number of purchase order. Thereby the shop may treat conveniently with the buyer before stock is received, should this be necessary. The duplicate of requisition has space for purchasing order number; on the orig-

inal requisition retained by the buyer is noted price and terms and these forms are filed, classed by material, and checked weekly by removing all requisitions filled.

The purchasing orders are made in triplicate, each copy on paper of a different color. The first two sheets are the same in matter and one is sent to the receiving clerk who notes the entire receipt of goods demanded by that order The other goes to the manufacturer or dealer with complete shipping instructions, the buyer's order number, number of the account to be charged, shop ordering material with job number, etc. The third sheet is called the "Hustler" and is shown in Fig. 8. This form is 8½x11 inches and is used to check and anticipate receipts of material. When the clerk receives this form he notes a date, in the line following "Acknowledgment Due," far enough ahead to give due time for reply. When the shipper replies promising delivery, a date is noted in the space following "Material Due." If dealer fails to acknowledge order, attention is promptly called and another date for reply assigned. The back of the form shown in Fig. 7 is devoted to a synopsis of correspondence relative to the requisition. The "Hustler" is handled in connection with a card system as follows: When the clerk receives the purchase order he notes the number of the order and the name of the firm from which the goods are ordered on a card, Fig. 9, 2⅛x4 inches. The small squares are reserved for the date when an acknowledgment of order should be to hand. The cards, Fig. 9, are placed in racks, with 31 divisions, one for each day in the month, the card being located in the division corresponding to the date on card. The card racks are examined every day and the "Hustler" sheet it represents is given attention. The "Hustler" sheets and cards are also useful in reference to engagements, etc. The cards promptly remind the clerk every day that certain

RCE & SMITH-VAILE CO.

EPARTMENT GENERAL SUMMARY *Order No.*

CREDITS

SHIPPING LUMBER		BOLTS	SUPPLIES			COSTS						
FEET	COST											

THE IRON TRADE REVIEW

OF MATERIAL, CREDITS, ETC.

"Hustler" sheets need attention and the matter is promptly and easily followed.

When the goods are received the clerk makes out a form showing cost of goods with cartage and freight. The total enables the stock clerk to charge out the material at full cost and to make correct returns to the cost department.

The purchasing department, on notification by the railroad companies of the arrival of cars, sends instructions in return and provides each shop with a copy. The stock department avoids demurrage charges by this advance information and can provide storage.

All contracts for material are briefly summarized on the form shown in Fig. 10, which is 5x8 inches. The original contracts are carefully filed away from danger of destruction and the invoices may be checked from the substitute with expedition. The invoices are stamped one receipt for date lines, etc., the quotation clerk checks the prices and extensions and then the clerk in charge of the "Hustler" sheet records the information on his copy. If found correct, the freight receipts are attached to invoices and they are handed to accounting department.

This in brief is the outline of the system followed by the purchasing department. Nothing has been said of the thousands of catalogues (over 5,000) carefully filed and indexed and the prompt connection with the railroads, etc. Space is lacking for a thorough exposition in detail of the method of the purchasing department. It may seem from what has been said, however, that the system is cumbrous and complicated but such is not the case. There is a frequent duplication of the one clerical effort, as by means of carbon paper copies are almost as easily made as the one original entry, and thus the repetition is purely mechanical and does not entail the same thing being done by different clerks. The frequent use of printed forms does not mean a multiplication of what is often contemptuously termed "red tape." The forms are selfexplanatory and there can be no misunderstanding of their purpose and as all transactions are performed on written authority only, no verbal instructions being accepted, there is little or no opportunity for blunders. The entire system is in thorough accordance with that general principle of modern accounting, that a minimum of clerical effort with a complete record is the great desideratum. Along this line of development it is natural that suitable forms will comprise all repetitive material and that only such entries as are unavoidable shall be inserted with the pen. The Stilwell-Bierce & Smith-Vaile Co.'s method well exemplifies that purpose and is highly effective and commendable.

R. I. C.

THE PERSONAL EQUATION IN INDUSTRY.

In an address delivered on May 19 before the students of Wharton School of Finance and Economy, University of Pennsylvania, Philadelphia, Mr. A. E. Outerbridge touches on some phases of the personal element in manufacturing in a thoughtful and interesting way. Mr. Outerbridge deals with industrial and engineering problems in a thorough and at the same time comprehensive way, and we are glad to be able to present below a synopsis of his address:

In all original scientific investigations the importance of the "personal equation" of the observer, or, in other words, his propensity to error, is well recognized, and in astronomical calculations this error necessarily assumes the importance of a definite factor, which must be ascertained and eliminated.

Instruments of precision have been devised for the purpose of accurately determining this error, and I have an interesting record of my own average liability to error in noting and recording the precise moment of transit of a spot of light moving across the crossed hair lines in the field of a telescope made by an instrument belonging to the Government. It is my present purpose to endeavor to point out the value of the personal equation as applied in a somewhat novel way in the conduct of business affairs to the practical management of men, especially in large industrial establishments. I am informed that many of you are preparing in this department of the University to assume later on in life managerial positions, and I have been requested to address you on some topic in the field of practical business administration of industrial establishments. Having been for many years a daily observer of the conduct of affairs in some large industrial works, without being myself responsible for the management on the one hand, or engaged in actual manual work on the other, I have been enabled, perhaps, to see both sides of questions that have arisen, from time to time, between the management and the operatives in these establishments, some-

what as a judge who listens to the arguments of opposing counsel can see the merits of both sides of a case and thus forms a clear conceptions of the underlying facts. As a result of this study I have formed certain conclusions, which I will briefly formulate.

First. No system of management has yet been devised which can prevent theft of time by workmen, and it is a trite saying that "time is money." To illustrate this proposition, let us visit, in imagination, a well organized establishment employing several hundred, or, it may be, a thousand or more men; there are several in this vicinity. One concern alone in this city employs over ten thousand men and boys. If you should notice a gang of ten men in any establishment standing idle all the day long, you would naturally be amazed at the apparent lack of discipline; yet I confidently assert that there is no establishment employing a thousand men in which the actual loss of time, every day, through idling and gossiping does not exceed in the aggregate the entire time of ten men for ten hours each day. A loss of but six minutes a day in this way by one thousand men equals 6,000 minutes, or 100 hours, or the equivalent of the full time of ten men for ten hours.

If no system of espionage can prevent this loss, how can it be minimized? The best way, in my judgment, is to make every man, in effect, his own employer, or rather the treasurer of his own time, and the only practical way to do this is to pay the largest premium in addition to the standard wage rate for the largest individual output in a given time.

In the old days of unaided hand labor "a day's work" represented a fair average expenditure of physical power of an able bodied man. Today there are few occupations save that of artists (in which physical labor scarcely enters into the question), where hand labor unaided by machinery still exists in civilized communities.

It is not my purpose to dilate upon any special premium system of payment. I assume that these topics form a part of your regular curriculum and are familiar to you all, but I wish to point out some features which are not

"HUSTLER" SHEET.

Acknowledgment due 19 | Material due 8 15 25

35466/16 M April 14/1902.

East. B. F. Goodrich Co.

Boston, Mass.

SHOW ON TOP LINE THE DATE OF BILL. ON THE SECOND LINE THE AMOUNT, AND OPPOSITE THE RESPECTIVE ITEMS THE QUANTITY BILLED ON THAT DATE.

5/10	5/16	5/27			
$40/-	$25/-	$40/-			
		50	50	X	Valves
30	20		50	M	"
40	10		50	R	"
		To be applied on contract of Jan 6.			

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FIG. 8.—PURCHASING AGENT'S COPY FOR CHECKING RECEIPTS OF MATERIAL. SAME FORM HAS SPACE ON BACK FOR SUMMARY OF CORRESPONDENCE.

Requisition No.

Name_____

Should Have Attention on Date Shown Below.

FIG. 9.—"HUSTLER" CARD.

Contract made with .....

Dated..... *S. M. No.*.....

For .....

Price named.....

.....

Freight allowance.....

.....

Terms .....

.....

Quantity.....

To be taken out prior to .....

Date of Inv	Amount of Bill	Weight	Car No.	WHICH Shop	Date of Inv	Amount of Bill	Weight	Car No.	WHICH Shop

FIG. 10.—SUMMARY OF PURCHASING CONTRACT.

found in text books and can only be learned by direct observation and experience.

Second. The foundation or basis of any successful system of management of industrial establishments is mutual confidence between the employes and their employers. Without this no system can succeed. Lack of perfect confidence on the part of employes in the absolute impartiality and strict sense of justice of the manager of an industrial establishment not only suffices to prevent the successful introduction of improved systems of cost keeping, payment for work done, etc., but it is the direct though hidden cause of monetary loss to the establishment which cannot be readily detected, for it is of an intangible character.

If my statement be true that in the best regulated establishments an average loss in time amounting to six minutes per day for each employe is less than the minimum loss from such little driblets, which are unnoticed, how much greater may the loss be when the employe suspects that the manager is all the time trying to obtain concealed advantages?

Without the full confidence of his employes the cleverest man in the world cannot obtain from his men that hearty cooperation which is necessary to the successful conduct of any manufacturing business, and many failures may be traced to this cause alone. On the other hand, the manager who has once gained the full confidence of his operatives need not fear to hold them to the strictest accountability for their time and work, and they will always respect him therefor.

There are certain laws regarding the relation between employers and employes which are immutable. Philanthropists and theorists have tried time and again various experiments, sometimes on a great scale, with a view to modifying these laws, but they have always failed; while, at the same time, there have occurred, through the natural processes of evolution, far reaching and indeed stupendous changes and improvements in the condition of labor in all trades where machinery has been introduced for the very purpose, it may be, of supplanting hand labor. I have, on former occasions, addressed the students of the Wharton School upon this topic, and therefore will not dwell upon it now.

It may seem anomalous to say that the higher the class of labor in manufacturing establishments the cheaper the product, yet this has been proved time and again, and it has come to pass through the aid of machinery. The "skilled" workman of today in almost any trade is a man who can so deftly and judiciously operate a machine, or a number of machines (representing often an investment of many thousands of dollars), that the output is largely increased thereby, without necessarily increasing unduly his own physical or mental labor; the employer can well afford, therefore, to offer large pecuniary inducements in the shape of premiums for such increased output and the results are sometimes truly astonishing. As a single illustration I may mention a case coming under my own observation. A year or two ago I visited Mr. Edison at his laboratory at Orange, N. J., where there were more than a thousand people employed. Mr. Edison showed me some parts of the frames of cheap phonographs which he said formerly cost for the machine work of drilling holes alone about forty cents each. The same work now costs about four cents, and the attendant of the machines gets higher wages than formerly. Every successful manufacturing establishment can furnish similar evidence.

Perhaps the greatest difficulty a manager of such works experiences in his effort to cheapen the cost of manufacture is the ingrained idea which very many operatives have that there is a maximum wage for each class of workmen, beyond which no man dare strive to go, for, sooner or later, a readjustment of the wage rate will follow by cutting down the piece work price, and as long as this view obtains few workmen will try to do their best. A premium on the output, in addition to a fixed piece work price, with assurance that this price will not be cut as long as the conditions of manufacture continue unchanged, is the only rational method, in my judgment, of overcoming these prejudices of the operatives.

Third. I have been asked to say something with respect to "business and philanthropy." This is a delicate subject and needs to be handled carefully. As a general proposition I may say that the result of my own study and observation has led me to the conclusion that, though beautiful in theory, the two do not, as a rule, work together successfully, and some of the reasons therefor are not hard to find. The American workman is self respecting, independent, and generally well to do. He resents any approach to paternalism on the part of an employer. He does not desire, and will not accept, anything savoring of charity. He is suspicious of philanthropic schemes devised for his apparent welfare, especially if they curtail in any way his cherished liberty and freedom of conduct. In saying this I do not wish to be misunderstood, or to underrate the advantages which may accrue to employes, as well as to employers, of philanthropic plans devised for the aid of sick, injured or infirm operatives. In one of the largest and most successful manufacturing establishments in the world an admirable system is in vogue, whereby unfortunate men are helped in time of need, but so judiciously and secretly is this done that the world knows nothing about it, and if I should name the establishment it would violate confidences that I have received, not from the managers of the works, but from men who have been thus aided in a way which has not awakened any other feeling than that of gratitude. You cannot find any allusion to these matters in the rules posted up in the works, and, in fact, I believe there are no rules. There is no contract in existence; there is no guarantee that if a man is injured, or if he is sick, or in trouble, that the helping hand will be extended to him, yet I doubt not that every one of the thousands of men employed in these shops goes to his daily work with a contented feeling that, should an accident befall him while on duty, his family would be cared for while he might be incapacitated for work.

I may say that it appears evident, from whatever point of view the question may be studied, that the value of the "personal equation" in management of large industrial works is a most important factor in the successful conduct of such enterprises.

THE WORKS OF THE BRITISH WESTINGHOUSE ELECTRIC & MANUFACTURING CO.

From a recent issue of London *Engineering* we obtain the data given below concerning an important American manufacturing enterprise that has been watched with interest from this side from its inception:

The completion of the large works built by the British Westinghouse Electric & Mfg. Co., Ltd., for the manufacture of the well-known Westinghouse electrical machinery, steam engines, and gas engines, is practically accomplished. They are the largest of their kind in this country, and probably no other firm has ever commenced a manufacturing-engineering business on such a large scale. It can never be said that the British Westinghouse Works have advanced in size from a small beginning, and it is this unique feature which goes a long way towards making the new works most instructive and interesting to engineers and other manufacturers. No great effort is required to realize the foresight and abilities of those responsible for such a huge undertaking. The design, the construction, the equipment, and, afterwards, the organization of the whole on a commercial and economical manufacturing basis are all necessary factors in the development of this scheme, and can only be carried out successfully by those who are really the masters of modern engineering.

The works are situated on a portion of the Trafford Park Estate in Manchester. A better position could hardly have been wished for. Manchester is geographically near the center of the United Kingdom and is in direct communication with the sea. The site chosen is also particularly well adapted for the work in hand: it is bounded on two sides by the Bridgewater Canal, as shown in the plan (Fig. 2), and is directly connected with the main railways, affording the best shipping facilities for all parts of the world.

The area of the site acquired is about 130 acres, some 55 acres of which are enclosed within the buildings, while 32 acres are roofed in.

The various departments of the works will occupy separate buildings which are arranged in such order of position that the least possible time is taken in passing the materials and parts of the machines under manufacture from one process to the next. There are in all nine buildings, including the

offices. The latter are in an imposing structure, six stories high, facing the main entrance to the works. It is divided up into numerous offices, store-rooms, and special fireproof chambers, wherein the valuable works' records will be kept. The general clerical work, shipping department, engineers and drawing departments will be gathered together here in offices which are perfect models of what can be accomplished in the way of securing the comfort and health of the employes. The lighting, heating, ventilating, and sanitary arrangements are the best that modern science can devise, and the general finish of the whole building is of that plain, substantial form which, if it does not greatly please all, displeases none.

The works building proper are all similar in construction. They are built of steel columns, bricked in and supporting steel roofs. The thickness of the walls varies from 19 inches to 23 inches. The ample window lighting arranged for is supplemented by sky-lighting, the roofs being glazed throughout with panes of wired glass. This glass has a close square-meshed wire netting running through it, and it is excellent for overhead work; should a pane by any chance get broken, the fragments are held by the embedded wire, and accidents likely to be serious due to falling glass are thereby avoided. Some 300,000 square feet of this glass has been used on the roofs of the works. The various buildings are all rectangular in form, set parallel with each other, their lengths running almost due north and south. They are arranged in the order shown on the plan. The iron foundry is on the extreme east, and following towards the west come the brass and malleable iron foundry, with the pattern shop and stores built in line immediately south of it. Close alongside is the steel foundry, followed by a huge building designated on the plan as the machine shop

small, each requiring little power for its driving, all practically in constant use the whole day long, and somewhat clustered together, it will usually be found advantageous to drive these machines from a common shaft driven by a single large electric motor. On the other hand, machines requiring large powers, portable machines and those which are only required periodically, are usually far better when driven each by an independent motor equipment.

Naturally, both these conditions exist at the Trafford Park Works, and, consequently, particulars of the electrical power applications in the shops will be exceedingly interesting, and probably of great value to many.

The buildings are quite completed, and they offer several points of interest which it would be well to touch upon at the present time.

The contract for the entire building work and construction was placed in the hands of Messrs. James Stewart & Co., the well-known contracting engineers, and has been carried out under the direct personal supervision of Mr. Stewart. Under this able leader the work has, from first to last, been pushed forward to completion with a rapidity probably never before attained in the construction of substantial steel and brick buildings. The illustrations show this fact very forcibly. In Fig. 3 is given a view of the state of the work in June of last year—about nine months ago. It will be seen that the steel work at that time was far from being completed. The next illustration (Fig. 4) is from a photograph showing the actual condition of the works. The large machine shop may be regarded as complete; the steel work is practically erected, and a very large portion of it is bricked in; window frames are in position, and the roof already covers a considerable portion of the building.

FIG. 1.—SECTIONAL ELEVATION OF BRITISH WESTINGHOUSE ELECTRIC & MFG. CO.'S PLANT.

This is built in five parallel bays, or aisles, three of which have upper stories. The total dimensions of this building are about 430 feet wide by 1,000 feet long; probably far larger than any other general engineering shop in the country, and in it will be prepared, machined, and fitted all the numerous parts and materials required in the construction of the various machinery and apparatus manufactured by the British Westinghouse Co. for electric and general power engineering. Certain spaces in the machine shop are allotted to the manufacture of some specific type of apparatus which will cover a range varying from simple knife switches and delicate electrical instruments, up to the largest electric power generators produced and the very large steam and gas engines, in the manufacture of which the name Westinghouse is so well known.

In this article the engineering equipment of the various shops cannot be dealt with in anything like detail, since the bulk of the plant is not yet in position. The work of installing it is, however, in full swing, and the shops at the present time are in the hands of a vast hive of busy millwrights, machine fitters, and erecting engineers, all bent on getting the numerous machine tools and devices into running order as rapidly as possible. A full description of the most interesting types of machinery and plant put down will have to form the subject of another article, which will be the better reading and more instructive if it deals with the completed work in this direction, saying rather what it is than what it will be. Of course, it will be understood that electrical driving is to be used throughout; this will, no doubt, be applied in all cases in such a manner that the best results shall be obtained. This matter of machine driving by electrical power is one that in all cases requires very careful consideration. It is just as foolish to declare haphazard for the "one machine, one motor" principle as it is to utilize one large motor to drive the whole shop if certain conditions are not taken into account. Where machine tools are individually

The building operations are now practically over, the usual details of finish being the only work remaining to be done. The ability of Mr. J. C. Stewart has been freely commented upon in the general press, and doubts as to the possibility of men being able to do the immense amount of work which he claims his men have done have been almost as freely expressed. Mr. Stewart has, however, his records of the work to substantiate those statements, and, after all, those who see the works as they are today, and compare them with what they were twelve months ago, cannot doubt that wonders have been performed.

In all there are 17,000 tons of steel in the works buildings, the machine shop alone accounting for 9,000 tons. The number of bricks used is about 10,000,000, including 1,000,000 firebricks. The total quantity of timber used throughout reaches the enormous total of 9,000,000 feet, of which 3,000,000 feet has been taken to form the gallery floorings and roof-sheeting of the machine shop; 3,800 men have been engaged in putting together this enormous quantity of material. The best men only of their respective trades were employed, and they have received higher wages than those fixed by their trade unions. The trade union wage for bricklayers is 10d. per hour; the men received 11½d. No doubt this fact, combined with the exceptional ability and experience of Mr. Stewart in organizing the methods of work and the control of the men, accounts for the records which resulted. It is almost incredible, but it is a fact, as pointed out by Mr. Stewart in a long and openly straightforward letter to the *London Times*, March 10, 1892, that the number of bricks laid per man per day of 9½ hours averages throughout about 1,800, and on common straight work in some cases the average reached a total of 2,250 bricks per man per day.

The floors are all of asphalted blocks set on a concrete bed about 1 foot thick.

The works buildings will be heated by air admitted at a

temperature of about 60 degrees when the thermometer is at zero outside. The air is heated by passing over steam coils, the circulation being maintained by power driven fans. The pipes, electrical conductors, etc., are all installed in a brick tunnel, 8 feet by 6 feet inside dimensions, which traverses the whole works and aggregates about one mile in total length.

Particular attention has been given to the sanitary arrangements and to the provision of conveniences for employes. There are 100 washstands in the machine shop and about 300 in the other buildings. Clothes lockers are provided and rooms are set apart so that workmen may change their street clothes for working suits, without inconvenience. Separate apartments, well fitted and comfortably arranged, are provided for women employes.

Fire protection is a point which has been well borne in mind; the shops are fitted with automatic sprinklers supplied from a lofty water-tower. The pattern shop is entirely of fireproof construction and fitted with automatic door and window fireproof partitions; similar partitions are also built in the office building.

of the machine shop. Steam driven electric generators are to be used at first, but it is expected that in two years' time the steam engines will be replaced by gas engines working in conjunction with a gas-producer plant.

It will be seen from this short article that the new Westinghouse Works offer many original features for the study of those who are at all interested in engineering manufactures. They have been built in a city which is already known as one of the busiest manufacturing centers of the world, and will, doubtless, in the near future enhance the reputation of Manchester very considerably. The Westinghouse works and the methods employed therein will be watched with the keenest interest by all for some years to come. It is well known that the Westinghouse people believe that proper thought and care for the workman are points which play very considerable parts in securing success. The works themselves are as perfect as possible from the hygienic point of view. The health and tone of the employes is to be preserved—that is, their efficiency is to be maintained. Under these conditions no driving is necessary; a man is encouraged in his labor, and is thoroughly interested in its progress. So the combination of

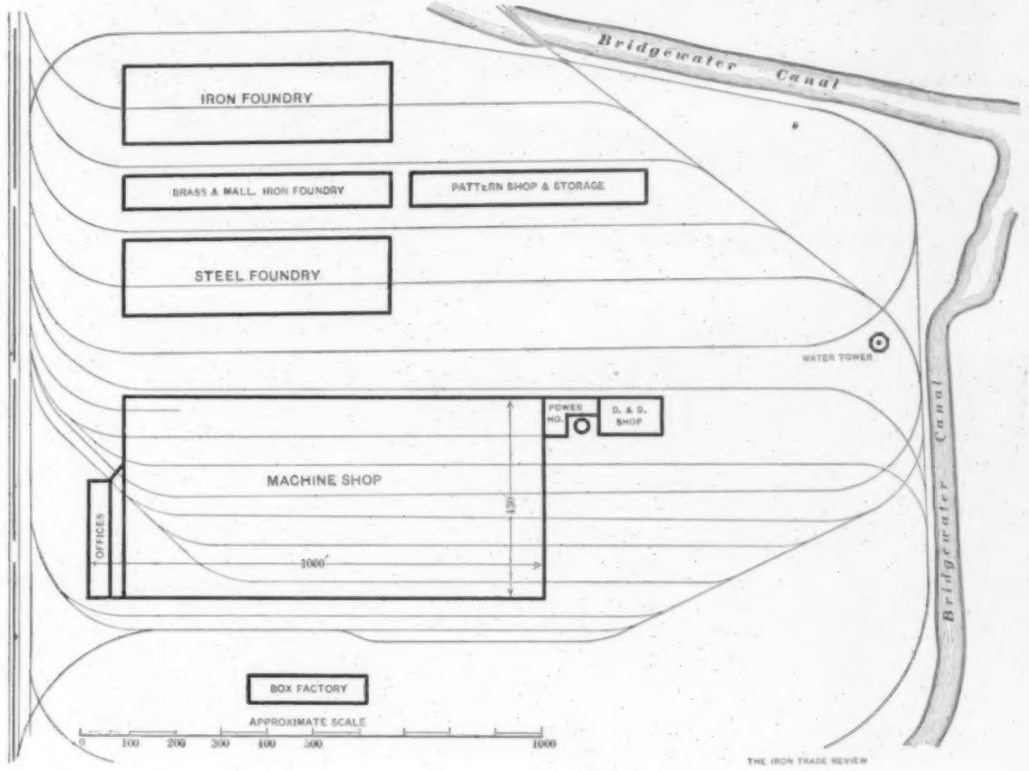


FIG. 2.—PLAN OF BRITISH WESTINGHOUSE ELECTRIC & MFG. CO.'S PLANT.

Ample facilities are provided for the conveying and lifting of materials; many heavy traveling cranes traverse the lengths of the works buildings. Two overhead traveling cranes, of 50 tons capacity each, run on separate tracks full length across the northern ends of the works buildings, from the iron foundry at one end to the machine shop at the other. Two similar, but lighter, crane tracks are placed between the machine shop and the steel foundry, running lengthwise at right angles to those mentioned first. The works are served at all points with an extensive network of standard gauge railway; all buildings are so connected; the lines traverse the full length of the aisles of the shops, and the machines and cranes are thus placed in direct connection with the main line railways. The total track length of the works is 15 miles, and five locomotives will be used thereon. It should also be mentioned that among the rolling stock will be five 50-ton pressed steel cars, the first of such a large size and type to be used in this country. The general arrangement of the railway system is shown clearly on the plan.

The power generating house adjoins the southeast corner

up-to-date buildings and machinery with a practical and logical humanitarian system of organization will be brought into practice on a very large scale. The outcome will be watched with the keenest interest, but there can be no doubt as to the result; the chances are all in favor of a great and prosperous future for the new works.

Henry & Allen, of Auburn, N. Y., have been engaged for ten years in the manufacture of cutting apparatus for harvesting machine builders, and makers of knives of all kinds for agricultural use, having for customers most of the prominent manufacturers of the country in these lines. They have recently added to their line of knife work steel drop forgings for agricultural works, general machinery, car building and railroad uses. An entirely new plant for this work has been installed, the equipment in steam drop hammers being particularly complete and modern. This includes ten hammers with a wide range of capacity recently completed at the works of the Chambersburg Engineering Co., Chambersburg, Pa.

SPECIFICATIONS FOR STEEL FORGINGS AND CASTINGS.*

BY WILLIAM R. WEBSTER.

In view of the good results which have followed the wide discussion of the rail specifications of the American Section of the International Association for Testing Materials, I now offer for discussion its specifications for steel forgings and steel castings. It is not necessary to emphasize the importance of reaching definite conclusions on these subjects. Engineers, consumers and manufacturers are alike interested in securing good, reliable, uniform steel.

In this connection I would call particular attention to the important paper read by Mr. C. H. Ridsdale, last September, before the Iron and Steel Institute, as bearing on them. The discussion of these specifications will be practically a continuation of our former discussions on "The Physics of Steel."

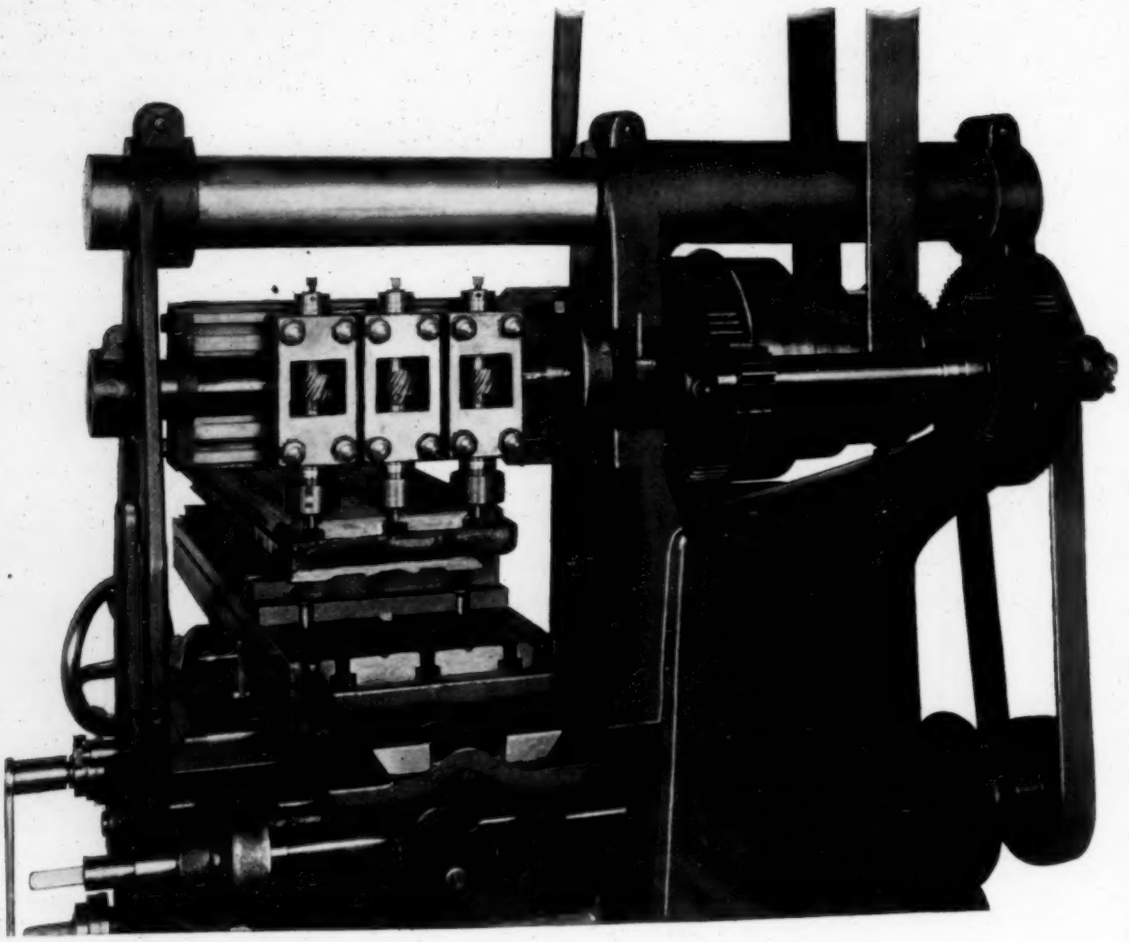


FIG. 1.—MILLING ATTACHMENT CUTTING THREE OR MORE T SLOTS AT ONE SETTING.

We have passed through a period in which the chemical composition of steel has received the greatest prominence; but failures of steel forgings and castings of the best chemical composition have shown that we could not control the quality of the finished product by the chemical composition alone. It must be admitted that differences in the physical properties of the steel, greater than those due to small variations in composition are produced by heat treatment both in connection with the mechanical work of forging and otherwise. The present result is a strong tendency to deem the heat treatment more important than the chemical composition. I think the mean course is the safer. We should give them equal importance; for we know that to produce the best results we must start with a good uniform material, and employ also, under intelligent supervision, the best methods of manufacture and subsequent working.

The annealing of forgings and castings is much neglected. The manufacturers who are doing the highest class of work for our Government and other customers, under rigid specifications, assert that all such work should be annealed. Other manufacturers of a cheaper class of work claim that annealing is not necessary, and, in some cases, even go so far as to say it is injurious. They adduce results to prove their assertions. But it is only necessary to repeat the annealing under proper conditions to prove that the source of such alleged injury was in the method of annealing used. In many cases attempts are made to anneal forgings that have been finished at too high a temperature without first allowing them to cool down below the critical point. This is merely slow cooling, and makes the material much worse than it would be if allowed to cool in the air.

In consideration of such controversies, I would suggest that discussion be directed towards the heat treatment of steel, with an endeavor to decide some of the disputed points, and thus to improve the methods of manufacture.

* Read at the Philadelphia meeting of the American Institute of Mining Engineers. The specifications of the American Section of the International Association of Testing Materials have been referred to in these columns.

Former stockholders of the Braddock Machine & Mfg. Co., Braddock, Pa., have decided to organize the Braddock Brass Foundry & Casting Co. for the purpose of erecting and operating a brass foundry at Braddock, Pa. A charter will be applied for shortly and the company will be capitalized at $200,000.

The United States Sanitary Mfg. Co. announces the completion of its large plant at Monaca, Pa., for the manufacture of enameled sanitary wares. The leaders in the enterprise are J. W. Arrott, Jr., A. E. Arrott and C. F. Arrott.

The Electric Controller & Supply Co., of Cleveland, has removed its plant for the manufacture of electric controllers and lifting jacks to the new works of the Wellman-Seaver-Morgan Engineering Co. The former company has one floor 300x45 feet, especially equipped for its work, and has fitted up fine offices.

SPECIAL LATHE AND MILLING ATTACHMENTS.

The Kempsmith Mfg. Co., of Milwaukee, Wis., has a number of special tools and appliances in connection with its shop system, as well as the interesting office equipment described in a previous article. One of these devices is a milling attachment for cutting three or more T-slots at the one setting. This attachment to the milling machine is shown in Fig. 1. The cutters are supported by a stout frame secured to the column of the machine and supported by the outboard bearing. The several cutter arbors are positively driven by spiral gears, and it will be seen that the vertical spindle housings are capable of lateral adjustment for varying the spaces between the T-slots. In addition to this adjustment, the cutter spindles can also have an individual range vertically of an adjustable character. This advantage is of course in addition to the ordinary vertical movement of the milling machine table.

Fig. 2 shows a lathe fitted with special headstock equipment for milling circular racks. The machine was not well located for the photographer, a shop column interfering at the right and, on the left, the limit of the photographic plate has cut off a goodly length of the bar carrying the worm hob. This bar is in reality of considerable length and extends well out to the left for reasons that will be made more apparent during the discussion of the device.

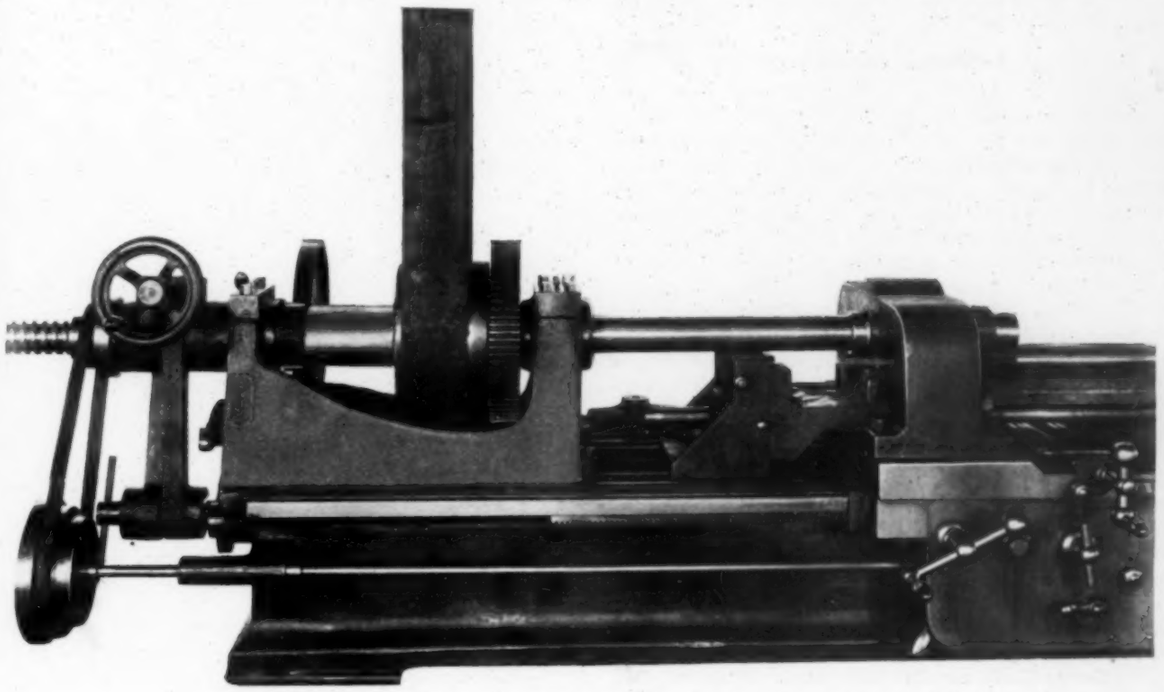


FIG. 2.—LATHE WITH SPECIAL HEADSTOCK EQUIPMENT FOR MILLING CIRCULAR RACKS.

Like the device in use at the plant of the Garvin Machine Co., of New York, which was described in *The Iron Trade Review* last year, it is shown applied to an ordinary engine lathe. The appliance is, however, radically different to the one adopted by the Garvin Machine Co. as will be seen on further examination. The lathe is a 21-inch machine and it will be understood that the device is used in holding the screw rack or thread in the under side of the tables of millers of that class in which the platen is fed by a short screw of large diameter; the screw engaging with a screw rack, thread or section of a nut, cut the entire length of the table.

The spindle, cone, gears and rear box of the lathe, are removed and a cast iron sleeve with the gears and pulleys shown are put in their places. The piece put in place of the rear box acts as a rear box and also carries the divided nut which engages with the thread on the cutter bar.

The cutter bar is supported near the milling cutter by a housing which is bolted to the lathe carriage and the bar is splined and driven by a feather fixed in the pulley sleeve.

Only one end of the table can be shown owing to the unfortunate position of the column aforesaid. The two ends of the table, the housings and vertical adjustment, are exactly alike and a description of the one end may serve for both. Each end of the table is supported by a knee sliding vertically in a housing which extends downward inside the lathe bed and affords ample length of bearing for the knees. The knees are adjusted vertically by means of eccentrics operated simultaneously by the shaft which shows underneath the table. The housings are adjustable along the bed of the lathe for different lengths of tables.

The first operation is to cut a concave surface in the bottom of the table. This is done with an ordinary side milling cutter of the right diameter fastened on the cutter bar instead of the hob shown in Fig. 2. The regular carriage feed is then engaged and on starting up the lathe the concave surface is neatly milled to the desired shape and size. The side milling cutter is then removed and a hob substituted on the end of the bar as shown in the illustration. In order to hob the thread, the divided nut at the rear end of the headstock is engaged with the thread on the hob or cutter bar by means of the hand wheel shown at the upper left hand of the illustration. The hob, on starting up the machine, passes along the table taking a cut. The table is then lowered away from the hob by means of the adjusting shaft and eccentrics, the divided nut on the cutter bar is opened, the carriage run back by hand and the table raised for the next chip. In actual service seven passes are required to hob a thread 8-10 lead, double. The depth of thread is 2-10 with clearance.

The bar has a substantial bearing at the cutter end in the housing on the lathe carriage, and the bed being held rigidly the cut is at once uniform and free from vibration. The method of course only permits threads of the same lead as the thread on the hobbing bar to be cut, but the results are so much more satisfactory than where change gears and other parts may introduce errors, that the extra expense of making this attachment, as compared with some other methods possibly, is more than warranted in a shop where a considerable number of these tables is made.

The Inter-State Foundry Co., of Cleveland, has given the Buffalo Forge Co., of Buffalo, N. Y., a contract for a 350-h. p. horizontal tandem compound. The order was placed through the Cleveland office of the Buffalo Forge Co., A. J. Vance, manager. The same office has taken an order for a large crayon drier for the American Crayon Co., Sandusky, O., having a capacity for drying 18,000 trays of crayon a day; also for heating apparatus for two new factories of this company.

Boston Meeting of the American Society of Mechanical Engineers.

The forty-fifth meeting of the American Society of Mechanical Engineers at Boston, May 27 to 30, was held under such gratifying auspices that it is difficult to imagine any future gathering giving its attendants more pleasure and profit in an equal number of days. The historical and engineering associations of New England and particularly of the "Hub," the remembrance of a previous meeting held there some 17 years ago which established the reputation of the Boston hosts for cordial hospitality—these memories and the excellent program prepared for the convention were sufficient to account for the remarkable attendance.

The first day was in one respect far from favorable. Rain continued steadily but it ceased about the time appointed for the opening reception and during the remainder of the week no fault could be found with the weather. The pleasant outdoor conditions were important factors in the excursions. The ladies among the visiting contingent were the special charge of Mrs. Francis H. Boyer and a committee of ladies of Boston and vicinity, and several excursions and luncheons were given them. The list of members and guests registered during the meeting ran up to 863. Among these were the following:

Members in Attendance.

William H. Wiley, New York; F. R. Hutton, New York; Arthur L. Rice, New York; Francis W. Hoadley, New York; R. W. Ryan, New York; Francis H. Boyer, Somerville, Mass; Robert S. Hale, Boston; C. J. H. Woodbury, Lynn, Mass.; Gaetano Lanza, Boston; William Lee Church, Boston; William W. Bird, Cambridgeport, Mass.; George H. Stoddard, Boston; Gardner C. Anthony, Tufts College, Mass.; Clarence A. Chandler, Worcester, Mass.; Ira N. Hollis, Cambridge, Mass.; William A. Johnston, Boston; L. S. Marks, Cambridge, Mass.; Edward F. Miller, Newton Centre, Mass.; A. L. Merrill, Boston; Cecil H. Peabody, Brookline, Mass.; S. G. Reed, Malden, Mass.; Peter Schwamb, Boston; George F. Swain, Boston; Albert B. Tenney, Everett, Mass.; Frederick A. Wallace, Lawrence, Mass.; Charles W. Boyer, Somerville, Mass.; George C. de Laval, Boston; Carl S. Dow, Auburndale, Mass.; Howard P. Fairfield, Worcester, Mass.; Francis E. Frothingham, Boston; Horace B. Gale, Natick, Mass.; George Warren Hammond, Yarmouthville, Me.; George F. Higgins, Worcester, Mass.; Albert F. Hall, Charlestown, Mass.; Richard Hutchison, Boston; James H. Kendall, Auburndale, Mass.; George I. Rockwood, Worcester, Mass.; William R. Park, Boston; Walter B. Snow, Watertown, Mass.; James A. Tilden, Boston; George I. Alden, Worcester, Mass.; Albert C. Ashton, Somerville, Mass.; Henry Bartlett, Boston; E. C. Brooks, Cambridge, Mass.; George H. Barrus, Brookline, Mass.; Ernest W. Day, Watertown, Mass.; E. D. Densmore, Boston; George J. Foran, New York; A. M. Goodale, Boston; Levi R. Greene, Boston; Milton P. Higgins, Worcester, Mass.; Charles T. Main, Boston; I. E. Moultrop, Boston; William O. Webber, Brookline, Mass.; E. P. Sparrow, Malden, Mass.; Walter E. Parker, Lawrence, Mass.; Edward P. Robinson, Malden, Mass.; Mrs. E. P. Robinson, Malden, Mass.; Will J. Sando, Boston; J. C. Schaeffler, Somerville, Mass.; Francis W. Dean, Boston; Thomas Hibbard, Dorchester, Mass.; E. D. Leavitt, Cambridge, Mass.; Edwin D. Mellen, Cambridge, Mass.; John H. Meats, Taunton, Mass.; Charles H. Morgan, Worcester, Mass.; W. S. Rogers, Keene, N. H.; George R. Stetson, New Bedford, Mass.; Charles H. Manning, Manchester, N. H.; Arthur C. Walworth, Newton Centre, Mass.; Geo. W. Weeks, Clinton, Mass.; C. A. G. Winther, Indian Orchard, Mass.; Walter L. Hill, Boston; P. H. Hogan, Mass. Inst. Tech., Engr.; John T. Boyd, Brookline, Mass.; Anthony Victorin, Watertown, Mass.; C. H. Benjamin, Cleveland, O.; John B. Mayo, Torrington, Conn.; John C. Knight, Winthrop, Mass.; William L. Tobey, Winthrop, Mass.; F. R. Low, New York; H. S. Robinson, Boston; James T. Boyd, Boston; John T. Hawkins, Boston; W. S. Hudson, Derby, Conn.; Eph. Smith, Boston; J. A. Herrick, Philadelphia; Lawrence J. Hagy, Philadelphia; William H. Gerrish, Paterson, N. J.; George H. Scott, Worcester, Mass.; A. W. Parker, Woburn, Mass.; Harrington Emerson, Harrow, England; August H. Kruesi, Schenectady, N. Y.; Alex T. Brown, Syracuse, N. Y.; James M. Dodge, Philadelphia; Kern Dodge, Philadelphia; E. E. Wood, Springfield, Vt.; J. E. Wilson, Bridgeport, Conn.; Arthur Herschmann, New York; Henry C. Meyer, Jr., Montclair, N. J.; H. C. Slater, Boston; J. Frank Seavey, Boston; J. S. Detrick, Baltimore, Md.; George T. Ladd, Fort Wayne, Ind.; W. L. Draper, Atlanta, Ga.; John Q. Wright, Fitchburg, Mass.; John H. Parker, Baltimore, Md.; Daniel Ashworth, Pittsburg; H. M. Norris, Cincinnati; L. S. Louer, New York; Lester G. French, New York; Malcom M. Libby, Worcester, Mass.; Carleton W. Nason, New York; C. H. Bierbaum, Buffalo; Mrs. F. R. Hutton, New York; Fred J. Miller, New York; W. G. Matheson, New Glasgow, Nova Scotia; E. R. Archer, Richmond, Va.; George S. Humphrey, New York; E. H. Parks, Providence, R. I.; Winslow Blanchard, Boston; Ambrose Swasey, Cleveland; Worcester R. Warner, Cleveland; William T. Keough, Boston; Frank A. Merrill, Boston; Edward T. Walker, Guest of Council; C. B. Appleton, Brookline, Mass.; Gardner T. Voorhees, Boston; Francis H. Stillman, New York; David Lofts, Chicago; L. Wehner, Boston; Carl B. Smith, Melrose, Mass.; S. T. Wellman, Cleveland; C. H. Wellman, Cleveland; Carl G. de Laval, Boston; William Walker, Boston; George P. Aborn, Boston; E. M. Jennings, Cambridge, Mass.; Francis E. Blake, N. Adams, Mass.; H. H. Suplee, New York; H. M. Lane, Scranton, Pa.; F. A. Pickernell, New York; Harte Cooke, Auburn, N. Y.; George H. Lilley, Ansonia, Conn.; William U. Fairbairn, Hyde Park, Mass.; H. D. Sharpe, Providence, R. I.; W. A. Viall, Providence, R. I.; C. E. Kinne, Watertown, N. Y.; Clarence E. Bement, Lansing, Mich.; Frederick P. Thorp, Boston; J. H. Libbey, Boston; W. I. Brock, Watertown, N. Y.; S. M. Snow, Providence, R. I.; Stephen W. Baldwin, New York; D. S. Jacobus, Hoboken, N. J.; Charles W. Hunt, Staten Island, N. Y.; George R. Cullingworth, New York; George Richmond, New York; Ward S. Jacobs, Hartford, Conn.; William H. Russell, Keene, N. H.; Wilfred Lewis, Philadelphia; Charles W. Thomas, Nutley, N. J.; W. R. Holm; W. W. Dingee, Racine, Wis.; L. R. Pomeroy, New York; J. W. Paul, Kittanning, Pa.; H. C. White, Melrose, Mass.; Edward Backus, Somerville, Mass.; F. H. Laforge, Waterbury, Conn.; Harry A. Burnham, Passaic, N. J.; S. N. Braman, Boston; William Watson, Boston; Sumner B. Ely, Pittsburg; Frank A. Merrill, Boston; E. R. Fellows, Springfield, Vt.; F. H. Richards, Hartford, Conn.; Chas. H. Fish, Dover, N. H.; Henry Binsse, New York; Charles W. Barnaby, New York; John D. Logan, New York; R. H. Fernald, New York; D. J. Lewis, Jr., South Orange, N. J.; S. D. Leland, Winchester, Mass.; Albert Stearns, Brooklyn, N. Y.; E. B. Waite, W. Newton, Mass.; Frank G. Bolles, Cincinnati; William W. Estes, Providence, R. I.; Warren S. Locke, Providence, R. I.; A. S. Granger, New York; John E. Sweet, Syracuse, N. Y.; Charles H. Little, Cleveland; George N. Comly, Syracuse, N. Y.; Geo. M. Brill, Chicago; D. A. Wightman, Warren, R. I.; Robert I. Clegg, Cleveland; E. A. Drake, Cleveland; T. R. Almond, Brooklyn, N. Y.; James Rowan, Glasgow, Scotland; H. L. Coburn, Boston; Charles T. Baker, Cambridge, Mass.; C. E. Billings, Hartford, Conn.; Robert W. Hunt, Chicago; H. G. Hammett, Troy, N. Y.; Henry R. Towne, New York; F. E. Galloupe, Lynn, Mass.; J. W. Higgins, Worcester; Dr. Henry S. Pritchett, Boston; James McBride, New York; William R. Webster, Philadelphia; J. Welch Lowell, New York; Gus C. Henning, New York; J. W. Seymour, Providence, R. I.; George R. Ferguson, New York; Arthur B. Ferguson, Salem, Mass.; Charles H. Corbett, Brooklyn, N. Y.; Charles B. Rowland, New York; H. S. Reed, Athens, Ga.; William Sangster, Hyde Park, Mass.; Charles R. Pratt, Montclair, N. J.; D. L. Holbrook, New York; Robert S. Brown, New Britain, Conn.; Charles Kirchhoff, New York; S. A. Capron, Taunton, Mass.; H. D. Gordon, New York; J. D. Stiles, Boston; William Hill, Collinsville, Conn.; Wm. H. Wiggin, Worcester, Mass.; G. O. Gridley, Windsor, Vt.; A. L. Burns, New York; Daniel Davis, Worcester, Mass.; Henry I. Snell, Philadelphia; R. E. Curtis, Boston; A. W. Thompson, Montclair, N. J.; C. A. Read, Durham, N. H.; Walter S. Ball, Winchester, Mass.; George E. Whitehead, Providence, R. I.; William S. Washburn, Wollaston, Mass.; M. W. Sewall, Roselle, N. J.; Edward F. Hughes, Watertown, Mass.; E. D. Meier, New York; H. G. Reist, Schenectady, N Y.; J. A. Capps, Schenectady, N. Y.; John

Riddell, Schenectady, N. Y.; Franklin Phillips, Newark, N. J.; George H. Phillips, Newark, N. J.; James Owen, Newark, N. J.; J. H. Abercrombie, Newark, N. J.; Charles Robbins, New York; E. S. Farwell, New York; F. M. Power, Solvay, N. Y.; A. E. Childs, Boston, Mass.; C. C. King, New York; G. E. Camp, Utica, N. Y.; C. W. H. Blood, Boston; E. H. Neff, New York; Henry D. Hibbard, Plainfield, N. J.; Arthur L. Williston, New York; F. H. Ball, Plainfield, N. J.; Francis B. Allen, Hartford, Conn.; A. R. Gillis, Syracuse, N. Y.; Sidney Holmes, O. S. Shantz, New York; H. P. Quick, Boston; John A. Serrell, New York; C. P. Higgins, Roselle, N. J.; E. E. Keller, Pittsburg; E. S. McClelland, Pittsburg; H. E. Longwell, Pittsburg; W. U. Fairbairn, Hyde Park, Mass.; Robert Allison, Port Carbon, Pa.; W. I. Slichter, Schenectady, N. Y.; F. Schumann, Philadelphia; F. H. Daniels, Worcester, Mass.; Robert York, Pine Bluff, Ark.; Louis Cassier, New York; Augustus Wood, Philadelphia; O. S. Porter, Porterdale, Ga.; T. E. Murray, Brooklyn, N. Y.; J. W. Lieb, Jr., New York; James Christie, Philadelphia; J. Sellers Bancroft, Philadelphia; Thomas H. Williams, Jersey City; F. A. Hannah, New York; Clark Fisher, Trenton, N. J.; William Roberts, Waltham, Mass.; Perley S. Wilcox, Rochester, N. Y.; Charles A. Alexander, Batavia, N. Y.; Harry E. Smith, Brooklyn, N. Y.; E. M. Herr, Pittsburg; William H. Boehm, New York; A. P. Boller, Jr., New York; Geo. H. Phillips, Newark, N J.; George L. Fowler, New York; George Dinkel, Jersey City, N. J.; J. J. McKee, Bethlehem, Pa.; W. H. Morse, Worcester, Mass.; E. R. Bullock, Pawtucket, R. I.; H. W. Bulkley, New York; W. D. Forbes, Hoboken, N. J.; R. H. Soule, New York; Sidney L. Smith, Roxbury, Mass.; William Kent, Passaic, N. J.; L. P. Alford, Winchester, Mass.; Jesse M. Smith, New York; R. A. Smart, Boston; Jas. McLaughlin, Philadelphia; W. D. Woolson, Springfield, Vt.; W. B. Mayo, New York; P. Plantinga, Fort Wayne, Ind.; David B. Oviatt, New York; Charles G. McIntosh, Boston; F. A. Halsey, New York; G. S. Curtis, Boston; Arthur M. Greene, Jr., Philadelphia; G. H. Musgrove, Boston; H. N. Dawes, Boston; H. W. Spangler, Philadelphia; Wm. V. Threlfall, Biddeford, Me.; Edward Robinson, Potsdam, N. Y.; Stevenson Taylor, New York; Wm. P. Canning, Warren, Mass.; H. F. J. Porter, New York; Frank Mossberg, Attleboro, Mass.; H. Winfield Wyman, Worcester, Mass.; Edward C. Bates, Brookline, Mass.; Charles H. Chase, Tufts College, Mass.; H. P. Merriam, New York; J. P. Reynolds, Jr., Boston; George H. Berg, Boston; J. O. De Wolf, Boston; William A. Bole, Pittsburg; William D. Cadwell, Nashua, N. H.; W. E. Hall, Philadelphia; Sidney A. Reeve, Worcester, Mass.; C. R. Harris, Worcester, Mass.; J. Fred. Wilson, Worcester, Mass.; William M. Whitney, Winchendon, Mass.; S. N. Bourne, Manchester, N. H.; C K. Sherman, Chicago, Ill.; R. M. Kendall, Boston, Mass.; William W. Crosby, Woburn, Mass.; Darragh DeLancey, Boston, Mass.; F. M. Rites, Ithaca, N. Y.; Fred W. Gordon, Hartford, Conn.; B. M. W. Hanson, Hartford, Conn.; Charles K. Stearns, Boston; E. H. McClintoch, Cambridge, Mass.; A. H. Blackburn, Mattewan, N. Y.; Joseph P. Davis, New York; Charles Whiting Baker, New York; Meredith Leitch, Springfield, Mass.; John Fritz, S. Bethlehem, Pa.; R. K. Le Blond, Cincinnati; Lewis Reed, Rocklandfi Mass.; C. H. Kingsbury, Boston; Alfred Clarke, Boston; S. D. Collett, New York; E. H. Carroll, Worcester, Mass.; C. M. Allen, Worcester, Mass.; C. H. Veeder, Hartford, Conn.; W. A. Pearson, Schenectady, N. Y.; Franklin Nourse, Lowell, Mass.; George M. Bond, Hartford, Conn.; E. B. Whipple, Providence, R. I.; William Gleason, Rochester, N. Y.; Frank J. Plummer, Norwich, Conn.; Frederick Collins, Providence, R. I.; W. P. Cotharin, Boston; A. L. Lovejoy, Hyde Park, Mass.; William O. Hildreth, Lawrence, Mass.; Eugene Childs, Boston; Henry Souther, Hartford, Conn.; C. M. W. Smith, Watertown, Mass.; W. B. Warren, Boston; George H. Perkins, Jr., Cambridge, Mass.; Robert McArthur, Biddeford, Me.; Jas. P. Tolman, Boston; A. E. Norris, Cambridge, Mass.; William T. Bonner, New York; George Mesta, Pittsburg; H. L. Gantt, Schenectady, N. Y.; A. J. Frith, New York; M. B. Kaven, Beverly, Mass.; C. L. Allen, Winchester, Mass.; John Humphrey, Keene, N. H.; W. B. Smith-Whaley, Boston; Augustus Smith, New York; D. C. Woodward, Wollaston, Mass.; W. E. Snyder, Pittsburg; Oberlin Smith, Bridgeton, N. J.; W. L. Ames, Worcester, Mass.; F. Ruel Baldwin, New York; W. H. Baldwin, Fort Wayne, Ind.; William R. Roney, New York; A. L. Rohrer, Schenectady, N. Y.; C. E. Brown, Peterboro, Can.; Albert Kingsbury, Worcester, Mass.; Charles R. Gabriel, Providence, R. I.; A. T. Nickerson, Jr., New York; Edwin Yawger, Pittsburg; Thomas J. Borden, Fall River, Mass.; Angus Ballard, Springfield, Mass.; Forrest R. Jones, Worcester, Mass.; T. L. Keppler, Boston; Stephen M. Pitman, F. A. Chase, Providence, R. I.; Freeman Higgins, N. C. Stiles, Hartford, Conn.; E. P. Bates, Syracuse, N. Y.; M. E. Harshey, Boston, Mass.; Gardner C. Sims, Providence, R. I.; E. J. Murphy, Hartford, Conn.; D. T. McLeod, New York; William H. Derbyshire, Chambersburg, Pa.; S. W. Powell, Buffalo; V. E. Edwards, Worcester, Mass.; K. C. Richmond, Providence, R. I.; F. B. Darost, Boston; John R. Freeman, Providence, R. I.; C. O. Farrar, Boston; Edward G. Thomas, Boston; L. K. Malvern, Elgin, Ill.; A. F. Nagle, Montclair, N. J.; George Leach, Providence, R. I.; J. W. Hill, Providence, R. I.; F W Schultz, New York.

Tuesday Evening.

The opening session was held in Huntingdon Hall, other rooms in the Rogers Building of the Massachusetts Institute of Technology being used for the social formalities. The reception room was elaborately decorated for the occasion. Mr. Francis H. Boyer, of the local committee, acted as chairman and, on taking the platform with the members of the Council and several guests, noticed the veteran past president, Mr. John Fritz, of Bethlehem, Pa., among his audience. Mr. Boyer promptly escorted the distinguished dean of mechanical engineers to the platform amid hearty applause.

The chairman in his opening remarks expressed the pleasure afforded the Boston members by a visit from the society and extended a welcome on the part of the local committee. He then introduced Dr. Henry S. Pritchett, president of the Massachusetts Institute of Technology. President Pritchett traced the progress of Massachusetts Institute of Technology in the years in which its attendance had grown from 200 students to 1,400 and averred that the institute did not live for itself alone. The time had gone by when one college tried to live and work alone. Each could work out its own problems in its own way but could unite with all the sister institutions on terms of amity and good feeling. In speaking more particularly of engineering education he pointed out that this is the day of the trained man, the man of scientific knowledge, and science is after all, as was observed by Huxley, only "common sense, organized and directed." It has been but a few years that engineers have been especially educated in the scientific foundation of their profession. Now we find men seeking engineering studies as a means of culture and the speaker gave several instances in which the trained student of engineering had elected finally to follow some profession not usually associated with such an equipment. Dr. Pritchett, however, in mentioning two graduates of the Institute of Technology who became clergymen, was of the opinion that the training would be found salutary even for such a vocation and that the efforts of his students on behalf of their congregations would be none the less effective and successful because they were directed by theological engineers.

This is the generation of the engineer, and in calling attention to the widespread recognition of the engineer's importance in the community the speaker told of a meeting at Cincinnati where one of the speakers so enthusiastically lauded the work of technical schools and institutes of technology that he had felt constrained to inquire what branch of engineering so warm an advocate of scientific training represented. Much to Dr. Pritchett's surprise he was told the gentleman was an undertaker. In closing he said that the world was looking to the engineer for illumination and guidance in the work of harnessing natural powers and thus making light the labors of man. In this work, carried on year after year with greater certainty of result, he recognized the labor of the members of the society he had been privileged to meet and welcome.

Chairman Boyer in introducing the next speaker called attention to the position held by George A. Kimball as president of the oldest engineering society in America, the Boston Society of Civil Engineers. Mr. Kimball alluded to the partnership in engineering work of civil and mechanical engineers and

mentioned more particularly the pumping engines designed for the city of Boston by Edwin Reynolds and E. D. Leavitt, both members of the A. S. M. E. He urged a closer relationship between civil and mechanical engineer, as both were working on the same lines and had common interests.

President Reynolds, of Milwaukee, had sent a letter explaining that on account of illness he would be unable to attend the convention. After expressing regret at the absence of Mr. Reynolds the chairman introduced Vice President James M. Dodge to respond to the address of welcome. Mr. Dodge took occasion to praise the work of technical schools generally. In relating his experience with graduates of these institutions, he told of one who entered the employ of his firm with excellent recommendations from a college professor who was also a member of the society. The young man did not especially distinguish himself and in discussing his worth with another member of the firm, it was said that probably he was after the type of the rising tide, he would not develop in hills and hollows, mountains and valleys, but would come up all over like the rising tide. In bearing testimony to the manner in which the young man met that expectation, Mr. Dodge jocosely congratulated himself that he was born before the day when he would have to meet the competition of technology graduates.

It may be said here in passing that Mr. Dodge presided at the subsequent meetings of the society with a rare felicity. By his adroit handling of the proceedings, combined with his good humor and apt remarks he made a most acceptable presiding officer.

A Business Session.

Wednesday the members met for executive business, the report of tellers and committees, the discussion of amendments, etc. The session was a long one and a very thorough and earnest discussion was had in regard to the business management and incidental questions. A proposition that the papers to be presented at the next meeting should be sent as under the old conditions of mailing advance copies to the entire membership, brought up the matter of the expense of the society. Several suggestions looking to the increased efficiency of the work as well as retrenchment, where this could be done without impairing the usefulness and the standing of the organization, were debated at length. The matter was ultimately tabled.

The fact that some members had taken an active part in the recent agitation for the introduction of the metric system, the society in consequence having been quoted as approving such action as a body, led to the reiteration of the neutrality of the organization in matters of this kind, the point was emphasized that it should be left to the council to make recommendations representing the consensus of opinion when this should be required. Some remarks were submitted in advocacy of the closer scrutiny of papers by the publication committee before they were read in order that the organization should not be made an instrument for the promotion of matters of an advertising or of an undesirable character. A motion was presented providing for the additional reference to a sub-committee of two members, expert in the particular branch of engineering considered in the paper, prior to final disposition by the committee as a whole. This amendment was under the rules continued to the next meeting. H. R. Towne presented a resolution, which was adopted, for a committee of six to consider the rules of the society, the committee to report in October and action to be taken in 1903.

Papers and Discussions.

The reading of professional papers was then taken up and Prof. D. S. Jacobus presented the final report of the committee appointed to standardize a system of testing steam engines. The speaker alluded to the loss sustained in the death of Mr. Bryan Donkin, the English member of the committee and an acknowledged authority in matters pertaining to heat engines. The committee which was appointed in 1898 submitted a pamphlet of 76 closely printed pages comprising a handbook on the systematized testing of engine and steam plants. The extensive ground covered by the paper gave much scope for the admission of criticism and several papers were submitted commenting at length upon the various details of the proposed methods. Among these contributing papers on the subject were E. T. Sederholm, William S. Munroe and Chas. L. Heisler, the last named submitting a description of a new calorimeter he had designed.

Prof. H. W. Spangler could not see the purpose in a combination of cards from compound and triple expansion engines. It was a lot of work without any return. All that could be determined from such a combined diagram could be determined from the separate cards, except one thing, and that is, one cannot seewhat the cards look like when they are put together. Mr. F. H. Ball extended his remarks given at a previous meeting by a demonstration on the blackboard of certain fallacies in regard to the engine diagram. Following a few remarks by Prof. Reeves on the advantage of testing the engine according to its cylinder efficiency, Mr. Bond offered a supplementary report of the committee on standard pipe unions. He gave some of the criticisms of manufacturers who found the standard chosen by the committee either too long or too short, etc., according to their individual preferences. Mr. Forbes thought that the retaining bead or internal ring should be on the outside of the gasket and not on the inside. In the former position it would offer less obstruction to the passage of steam and the working pressure would not be so liable to blow out the packing ring. A member suggested that the bead when on the inside would not contract the opening through the standard coupling to less than the area of the pipe and that having the bead on the inside of the gasket would tend to prevent portions of the packing being broken off by the steam and carried through into the engine cylinder. Mr. H. H. Suplee mentioned the desirability of the internal surfaces of pipes and fittings continuing in as unbroken and even a surface as possible. The inequalities of the bore through fittings was productive of frictional losses which might be minimized by bringing the connecting pieces more nearly in surface contact with as small pockets or projections as possible.

A member pointed out that the practical questions in regard to tapping would demand new answers in that case. Under present conditions the tap as it became worn was simply inserted to a greater depth but with a shoulder, against which the tap would bottom, the case would be entirely different.

The reading of professional papers was discontinued at this stage and in an adjoining room a light luncheon was served followed by a smoker. Then came the separation into small parties in charge of guides to the points of interest at the Massachusetts Institute of Technology.

On Wednesday evening the presiding officer announced the presence of a representative of the Government who would speak on the Louisiana Purchase Exposition. Lieut. Godfrey L. Carden, who will be in charge of the department of ordnance and machinery, said that there was not one important detail of the exposition not under the control of a commission of nine appointed by the President of the United States. The Government stood behind the enterprise and in many other respects the exposition will be different from the rest. There will be no charge for exhibition space, no outlay for power or light, and every possible facility for transportation, crane service, etc., will be afforded to exhibitors. It was for his hearers to decide whether they would make exhibits. There would be double the space allotted to machinery at the Pan-American Exposition at Buffalo and the transportation building is to be larger than the South Terminal Station at Boston. Government approval and assistance, exposition experience, high executive ability and unstinted financial resource would not only guarantee a successful enterprise but already it promises to exceed all similar undertakings.

Specifications for Steel Castings, Forgings and Plates.

Subsequent to Lieut. Carden's address, William R. Webster presented an account of the specifications for steel castings, forgings and boiler plate of the American Section of the International Association for Testing Materials. These were adopted as standard by the American Section at the Niagara meeting last year but no attempt has been made to put them in general use. The 2-inch test piece recommended in the specifications elicited some criticism. Prof. Gaetano Lanza urged that the question of the homogenity of steel castings in particular was more thoroughly determined by the use of the

8-inch test piece and he decidedly preferred that length. Gus. C. Henning read a paper enumerating at length discrepancies he had found in the specifications proposed by the American Section. He thought the specifications had been prepared without any regard to the standards established by international experts and he deprecated the introduction of a system which so pointedly ignored their research. S. M. Vauclain thought that the subject was of sufficient importance for the appointment of a committee to consider it in detail. Mr. Webster in his closing remarks said that the "despised" 2-inch test piece was the Government standard and he thought that Admiral Melville could take care of some of the criticisms.

A paper by George H. Barrus on "Tests of Steam Pipe Coverings," was read by the author. This detailed a series of experiments made by Mr. Barrus to ascertain the relative efficiency of protecting coverings now on the market. Mr. Crosby sent a memorandum, read by the secretary, in which he spoke of the unstable character of certain coverings tested. Some contained organic matter which would speedily deteriorate and the efficiencies noted in the tests would change in consequence. Prof. D. S. Jacobus described a number of experiments of a like character he had made entirely independent of the work of Mr. Barrus and with 2-inch pipe exclusively. He had used various pressures and his results showed a surprising agreement with the tests conducted by Mr. Barrus. For example, considering the 2-inch pipe, the two sets of figures would appear as in the following table of relative efficiencies:

	BARRUS.	JACOBUS.
Asbestoscel	76.4	77.2
Gast's air cell	74.3	74.4
Asbestos sponge	85.4	84.9
Magnesia	84.2	83.2
Asbestos Navy Board	82.0	82.3
Hair felt		86.0
Asbestos sponge hair felt—		
2-ply corrugated	85.4	
2-ply plain	86.3	

Chas. R. Pratt read a paper on the development of safety clutches in elevator practice. This was illustrated by the stereopticon.

The papers treating of the construction of the Atlantic Ave. power station, Boston, and a swivel joint for high pressure mains, were read by R. E. Curtis, the author of the latter paper and collaborated with I. E. Moultrop in the preparation of the other. The paper dealing with the power station was illustrated with some additional drawings to show more clearly the method and utility of the building construction. Mr. Morse inquired in regard to the superheaters at the station; whether they had been examined and whether they had given trouble from pitting. Mr. Curtis replied that the superheaters were frequently examined and had not deteriorated since their installation.

R. H. Fernald read an abstract of his two papers, treating of methods of determining the temperature of exhaust gases in combustion engines and the working details of a gas engine test. These were briefly discussed by Mr. Kent and Mr. Frith.

A paper by Charles R. Lucke on "Liquid Fuel Combustion" received highly complimentary comment from Mr. Frith. He was surprised and gratified that Mr. Lucke had been able to burn oil fuel by his method without a deposit of carbon. Mr. Lucke assured the members of the results claimed in his paper and mentioned materials which had been subjected to test and had maintained a perfectly clean surface under the conditions arranged by him for oil combustion.

Thursday Morning's Session.

On Thursday morning, Gus. C. Henning submitted an abstract of his paper on a roller extensometer and exhibited the apparatus. The instrument consists of two frames, one carrying the distance pieces on gauge rods, the other the working or reading parts, which, while placed systematically around the test piece, also mark off the gauge length on which observations are to be made and can be used in a vertical or horizontal position. The operation of the instrument is automatic and simple and is free from any influence of the observer. By the substitution of bars and pins of various lengths the apparatus may be used on test pieces of any usual length, as it is provided with equipment for 2, 2½, 4, 6 and 8-inch lengths. During the discussion mention was made of the fact that the Emery testing machines at Cornell University had been supplied with this apparatus for the determination of the yield point of materials, as it was not affected by the inertia of the testing machine, as might be the case with the "drop of beam" or fall of the pressure gauge. Mr. Henning said, in answer to a question in reference to the limitations of the apparatus, that the instrument was essentially one of precision and must be removed as soon as the yield point had been reached, otherwise it would be destroyed. For determinations up to the point of rupture an autographic apparatus was necessary.

An abstract of Fred H. Colvin's paper on mechanical stokers for locomotives was read by the secretary. The paper contained a description of the machine invented by John W. Kincaid, of Cincinnati, and enumerated the advantages of the locomotive stoker as follows: Increased work from the locomotive due to maintaining a maximum steam pressure under all conditions of service. Doing away with the necessity of constantly opening the fire door and admitting large quantities of cold air into the fire box, which opening tends to retard combustion and also has an injurious effect on the flue sheet. Even distribution of coal over the whole of the grate, obviating thin spots through which cold air may be admitted with results as injurious as when coming through the door, or even more so. Marked decrease in black smoke, due to the constant and steady firing according to the demands of the boiler. Economy of coal consumption, resulting from the steady firing already referred to. Mr. Soule in commenting upon the problems met by the invention said that there was no doubt that the limit of the human fireman had been reached and in coinciding with this view, Mr. Fowler said the Chesapeake & Ohio Railroad Co. had used the device with considerable success. The disadvantages of employing two firemen on one locomotive were obvious. The speaker was questioned in reference to the method of cleaning the fire when using a mechanical stoker and said that it was as easy as with the ordinary hand-fired boiler. One great advantage of the stoking machine was the closing of the fire door and the attainment of smokeless combustion, not entirely without smoke, but nearly so.

"An Improved Indicator Cock for Engines" was the title of the paper presented by A. K. Mansfield. A sample of the device was shown to the members at the meeting. It consists of a four-way connection and differs from the ordinary three-way indicator cock merely in having a fourth connection underneath which may lead to the steam space of the engine throttle, or to the exhaust pipe; or, when used on the low pressure cylinder of a compound, to the receiver space. The instrument is employed in determining the drop in pressure due to resistances in the pipe line—the determination of the steam pipe efficiency. A number of indicator diagrams were given with the paper to show the drop from the throttle to the cylinder and in the discussion Mr. Woodwell, inspector of electric light plants at Washington, D. C., brought out the point that the drop in pressure from steam pipe to cylinder was commonly influenced by a divided responsibility, the steam pipe being as a rule the choice and under the control of the puchaser and the design of the ports and valves being left of course to the discretion of the builder. Chas. W. Barnaby in discussing the indicator diagrams showing the fluctuations of pressure in the steam pipe as the engine valves opened and closed the ports in the cylinder, said that he had noted a few cards in his experience where there was a variation in the height of the two cards taken from the opposite ends of the cylinder and apparently no reason to account for such a condition. In such cases he had found, on obtaining a card from the steam pipe, that there was a triple curve in the diagram. The pressure fell in the steam pipe as the inlet port to the cylinder was uncovered and at point of cut-off the curve would assume an upward direction in the card, showing the rising pressure at the throttle. The speaker was of the opinion that these loops, in the cases he had instanced, synchronized with the vibrations or pulsations of the engine and that the coincidence had an effect in elevating the one card and depressing the steam line of the other.

Economies in Electric Driving in Shops and Factories.

The paper read by W. B. Smith-Whaley on "Electricity in Cotton Mills" was an elaboration of his previous contribution

in 1897. The author had had an opportunity recently to install several cotton mills generating their power electrically by means of steam engines and was now in a position to compare the results of this power from an economy standpoint with those already quoted and with other data bearing on this important subject. Prof. C. H. Benjamin submitted some figures obtained by one of his senior students at Case School from a number of electrically operated machine shops in Cleveland. He said that there was a great difference between machine shop conditions and the circumstances of the installations described by Mr. Whaley. Machine shops with engines of 100 h. p., for example, were large and furthermore the power required was fluctuating in a high degree, while the conditions in cotton-mills were directly the opposite. The "group" system of electric driving was but little more economical than the use of belts, ropes or shafting; possibly a 5 percent saving could be realized with the "group" method. H. H. Suplee quoted a statement made at a Philadelphia meeting by S. M. Vauclain as being of probable interest to the members. In Mr. Vauclain's opinion the introduction of electric driving had been equivalent to a gain of 40 percent in floor space. Mr. Whaley, in closing the discussion, admitted the peculiarity of some of his conclusions in regard to the lightening of engine friction. Many of the cards he had taken showing this minus result he had destroyed as obviously inaccurate and useless. More extended investigation and the checking of results by others independently of his own work had convinced him that the figures given in his paper were correct. It was not his intention to claim that there was no friction but that the system may return, by the inertia of the shafting and machinery, energy to the generators from the switchboard when the generators tend to slow down.

William H. Bryan, who had prepared a paper treating of some details of direct-connected generator sets, was not present but an abstract of his contribution was read by the secretary. The author had made a recent investigation into some details of the design and construction of steam-driven direct-connected generators and by correspondence and personal interviews with leading engine and generator builders had obtained some expression of opinion in regard to the procedure of the builders in reaching an agreement regarding the detailed design of shaft and bearings, the method of construction and final erection preferred and the advantages and disadvantages of a shaft coupled by flanges as compared with a continuous shaft. Walter M. McFarland, of the Westinghouse Co., and J. B. Stanwood, both members of the committee on standardization of engines and dynamos, sent written discussions of the paper and both urged that the generator capacity be greater than that of the engine. Mr. Forbes told of his difficulties with pin gauges. They had proved so unreliable that he found it necessary to wait for the parts and fit the pieces direct. He strongly advocated the use of Bond gauges as being most satisfactory in shop service. Mr. Kent inquired why the 50 percent overload of the engine had not been followed and said that while for nine-tenths of the time the engine might be running at the normal load yet for the remaining period the owner could well afford to run his engine at a slight loss in economy in order that the overload might be of service in lighting the shop, for example. Mr. Forbes was of the opinion that instead of a guaranteed possibility of overload it was preferable to give the engine a higher rating, as 75 instead of 50 horsepower, and it seemed best to place the engine according to its actual capacity rather than give it a certain power plus an overload.

The paper on "A Graphical Determination of Piston Acceleration," prepared by J. N. Le Conte, was read in abstract in the absence of the author, and the meeting adjourned.

Thursday afternoon the members participated in a sail down Boston Harbor, and on the way to the wharf had an opportunity to visit the Atlantic Avenue Power Station of the Edison Electric Illuminating Co. This plant was the subject of one of the papers read at the meeting and was found exceedingly interesting. An exhibition of an automobile steam fire engine was also given in the same locality by the city fire department. After an enjoyable excursion in the inner harbor and partaking of luncheon on the steamer, the party was taken by trolley cars from Downer's Landing to the plant of the Fore River Ship & Engine Co.

In the evening a reception was tendered by the trustees of the Museum of Fine Arts and the local membership.

A Technical Index and File.

On Friday morning the society was the guest of Harvard University and the concluding session was held in the lecture room of Pierce Hall, Cambridge. The first professional paper, "A Technical Index and File," was read by R. H. Soule. A discussion was presented by H. B. Quick who considered the system proposed incomplete by reason of the lack of subheads and the fact that references must be laboriously made by a careful examination of the cards in detail. He preferred the 4x6-inch card to the 3x5-inch. The larger size is not too large to be held in a note book and the increased surface affords an opportunity to enter a greater amount of data. The classification by subjects seemed preferable to him and he would have the boxes labeled with the subject matter treated by the cards contained in that compartment. He advocated a uniform size of boxes, with drawers having dimensions 13x14 and 20 inches deep. In default of this he would use standard letter boxes, 11x11½x2⅝ inches; these files to be arranged by the title of subject matter as entered on back of box. Mr. Quick was of opinion that the technical press could be of greater service to the engineer if care were always taken to start important articles on the left hand side and that the different articles should not interfere or overlap each other. This would leave blank spaces but these gaps could be filled in with advertisements, etc. Illustrations should not be on other pages than those occupied by the article to which they referred and the date of publication should appear on each page. G. T. Booridge showed a number of cards in different systems and preferred the inch system in these proportions as the several sizes are some 13-100 larger than the centimeter system. If the boxes, files, etc., were arranged to fit the former they would be found equally convenient for the latter but, on the contrary, had the cases been designed for use with the centimeter method it would be impossible to get in any of the inch system of cards. He proposed that manufacturers prepare their postal cards in accordance with a standard size and with special reference to filing in a card index. This was as important as a standard size for catalogues, circulars, etc. One corner of the card could be used for an entry of the subject matter and the remainder of the surface contain the illustration and other descriptive matter the manufacturer desires to circulate. The postal card would thus stand a much better chance of preservation and would be likely to be of much greater value to all parties concerned.

The *Engineering Magazine* and its index to current publications having received some attention during the discussion, Mr. H. A. Suplee of that journal briefly described its office system which has now indexed some 40,000 clippings. These are catalogued on the library plan. There are two card indexes and the clippings are numbered serially to agree with the cards. The clippings are folded and arranged consecutively in bundles having as nearly as possible the dimensions of the cards, each bundle containing one hundred clippings. The indexing and filing of the clippings are handled by numbers exactly in the familiar library style. Mr. Fowler offered a few comments on the question of standard sizes for catalogues, etc. The society had fully considered the question and in accordance with the recommendations of the committee he thought manufacturers should follow the plan of having uniformity in these matters. He had decided in his own practice to pay no attention whatever to catalogues which did not conform to standard dimensions. His first action on receipt of a catalogue was to apply the measurement test and then to start the publication on its way to the waste paper basket or annotate it for his assistant as the case might demand. He took the surviving catalogues and underscored the items carefully, no matter how small they might be, and these were then indexed by his assistant and he found that this thoroughness had been of a great amount of service in his work. He would remind his hearers that while he had a convenient outlet for some catalogues in a large waste paper basket, he had also a very neat file to welcome the catalogues of standard size. H. M. Lane in the increase of his file and the accumulation of matter found it

advisable on receipt of a new catalogue to have the index purged of useless material on the subject as treated in publications previously sent out by the same manufacturer. Oberlin Smith in discussing the question of standard sizes said that he had in his work adopted the 36x24-inch size for large drawings and by even divisions of these dimensions, as 18x12 inches and 9x6 inches, obtained a useful series and saw no reason why this method of sub-division could not be applied to printed matter and the card index. He feared, however, that it was too late to change the odd size now adopted for small sized catalogues. He could not go as far as one of the speakers in destroying catalogues because they did not conform to the standard dimensions. That appeared to him to be a suicidal policy. Mr. Soule in closing the discussion said that in his location, New York, space was too valuable for use in any but the most essential things and he had endeavored to make the system he had adopted as compact as possible consistent with his needs. It was difficult to say when matters shall become obsolete and it is only from occasional pruning and weeding out that useless material can be discarded. It seemed an impossibility to get manufacturers generally to adopt standard sizes for publications and even in other associations where supply men and manufacturers were numerous and had received the standards proposed with warm approval he had nevertheless found that the matter could not make the desired progress.

The chairman then appointed the following committee on rules, in compliance with the resolution passed at the business session on Wednesday: Ambrose Swasey, William O. Webber and John T. Hawkins. According to the terms of the resolution the committee retired and selected three additional members. They are Chas. W. Hunt, H. R. Towne and J. M. Smith.

F. M. Bowman's paper on "The Lowell Gaslight Co.'s Coal Pocket" was read in the absence of the author by the secretary. There was no discussion, as was the case also with the paper which followed, by H. M. Lane, on "Repairing a Broken Cylinder." V. E. Edwards, of the Morgan Construction Co., Worcester, Mass., read a paper on "The Flying Shear," as already published in these columns. While no discussion was elicited, the hope was expressed that the matter would be taken up at the next meeting.

Working of Sheet Metal in Dies.

The paper by John D. Riggs on the "Cold Working of Sheet Metal in Dies" was taken up for discussion and Oberlin Smith expressed the opinion that the paper was extremely fragmentary and that the subject was rather a matter for a volume than a paper of this size. Commenting further he said that in cup-shaped work the depth could be at one blow forced to a distance equal to one-half the diameter of the blank. In thin metal the material must be held to keep from wrinkling. He considered the productive speeds given in the paper as low and instanced can lids for one-pound cans, 3 inches diameter, which had been cut out at the rate of 22,000 per day, while 12,000 was a regular thing. In the case where an automatic feed press cutting bicycle chain links produces 90 pieces a minute, he knew this rate could be greatly exceeded and that 150 to 200 per minute can often be done. The number of strokes per minute multiplied by 500 would give the daily production of the machine. There was no difficulty in obtaining 200 pieces per minute with short strokes. Silver required greater time and in coin work, 100 silver dollars per minute is large and 80 the usual rate. His firm had made tools for coinage purposes and in speaking of rates of production he had obtained a rate of 100 per minute for pieces the size of half dollars but having inscription in Chinese characters and 125 per minute for coins the size of 25-cent pieces. Mr. Smith had seen an expert operative cut and draw 400 pieces per minute where the stock was fed by hand and the product was removed by an air blast. He had designed and guaranteed machines to notch armature plates at the rate of 250 notches per minute and had actually cut 300 to 350 per minute. He had tried to cut 400 but lack of balance weight in that machine had prevented this, but he had no doubt that it could be done. Wire staples had been cut and formed at a rate of 2,000 per minute. In the general discussion of the rapidity with which cut and drawn work can be produced, Mr. Hawkins mentioned a rate of 500,000 per day, and this was followed by a statement that a million pieces had been known by Mr. Smith to be produced in that time. This assertion was followed by a speaker who told of the work in a Connecticut cartridge factory where shells had been cut and drawn at the rate of 2,000 per minute on one of Mr. Smith's presses.

The paper by C. C. Tyler on "Standards for Machine Screws" had a supplementary letter from the author expressing the hope that a committee might be appointed to consider the question. The Pittsburg company uses from 4 to 5 million screws per year. He proposed a standard variation of 1.011 and 1.016 in the combined tap and screw variation. George M. Bond, of the Pratt & Whitney Co., was of opinion that the system proposed was peculiarly adaptable on account of the method of measuring diameters by the angles of the threads. He was especially gratified that the matter had been treated in this way, not by arbitrary numbers, but by actual decimal dimensions. Oberlin Smith commented upon the question of standard clearances for taps, bolts and nuts, and heartily favored the appointment of a committee to overhaul the entire subject. Ambrose Swasey complimented the paper highly and proposed that the question of appointing a committee of five members to consider the matter be referred to the council with power to act. This resolution was adopted. F. H. Boyer informed the society that a member present had brought the matter of standard screw sizes to the attention of the American Society of Mechanical Engineers some 22 years ago. He referred to Mr. Stetson and that gentleman was introduced and told of his difficulties in getting manufacturers to make threads to fit gauges and the effect of dull dies in changing threads. Wilfred Lewis said that he had been required by Mr. Sellers some years ago to obtain a formula for small screws, ¼-inch and less. He placed the formula, usually given, on the blackboard, $.24 \sqrt{d + .0625} - .175$ One of these factors had been modified by the adoption of .0146 or .0064 in the formula. He submitted the expression $.22 \sqrt{d + .25} - .11$ to the consideration of the society.

This concluded the presentation of professional papers and the secretary read a series of resolutions thanking the various organizations to which the society was indebted for a week of pleasure. The resolutions were adopted by a rising vote and the members and visitors adjourned to Memorial Hall, where they were the guests of President Chas. W. Eliot and the officers of Harvard University at luncheon.

Titanium Ores in 1901.

The occurrence and production of titanium ores is discussed by Mr. W. O. Snelling in Mineral Resources of the United States, 1901, now in press, United States Geological Survey, David T. Day, Chief of Division, with special reference to the recent discovery of large deposits of rutile in Virginia, which has brought to the attention of the ceramic and the steel industries the commercial possibilities of this ore of titanium. Hitherto, owing to the small supply that has been available, and to the impure state in which it is generally found, rutile has been but little used in this country, the few hundred pounds produced annually going largely to collectors of minerals and to the manufacturers of artificial teeth, who use the pure oxide as a pigment in reproducing in porcelain the natural yellow color of the tooth, notwithstanding the recognized value of titanium as a component of a special steel, and notwithstanding the use of the oxide for many years past by foreign manufacturers of pottery. Minerals containing titanium are found widely distributed and in such large quantities as to make it a relatively abundant element, though nearly all the text-books on chemistry speak of titanium as one of the rare metals. In some places, particularly in the Adirondocks, titaniferous iron ores are found in enormous quantities, making one of the principal components of the great rock masses which form mountains and constitute a geological formation.

Ilmenite is the most abundant of all the titanium minerals, and is found in beds of great extent at Kragerö, in Norway, Bay St. Paul, in Canada, and in Rhode Island, Connecticut, New York, North Carolina, Pennsylvania and Vermont, in the United States. Rutile is generally found wherever large deposits of ilmenite occur, and besides the localities mentioned

for ilmenite, it is found in notable quantities at Graves Mountain, Georgia, Magnet Cove, Arkansas, and on both sides of the Tye River, near Roseland postoffice, in Nelson County, Virginia, where the deposit is very large.

Under favorable conditions titanium oxide imparts to porcelain a fine yellow color. It is capable of being used with other substances to produce secondary colors, and it will withstand, without difficulty, the heat of the kiln, although at very high temperatures it increases the fusibility of the porcelain somewhat, acting as a flux. Mr. Snelling does not seem to think, however, that any extensive market for this Virginia rutile will develop in the pottery industry. With regard to steel, the experimental work, so far as tried, seems to show that the addition of titanium gives the steel a high limit of elasticity and a greater elongation as well as an increased ductility over simple carbon steel; and as titanium steel takes a good temper and is very hard, a number of possible uses suggest themselves for it, dependent only upon the economical preparation of some titanium alloy, the commercial production of which seems not to be an easy matter. As ilmenite is at the present time used exclusively as a source of titanium for steel, the outlook for the market for Virginia rutile seems a poor one in this industry also; and its use, amounting to a few hundred pounds annually, in the artificial-tooth industry is supplied by the rutile deposits of Chester County, Pennsylvania. Even under the most favorable conditions, says Mr. Snelling, the annual domestic market for rutile is not likely to exceed in value $2,000. In 1900 the production of rutile in the United States amounted to 300 pounds, valued at $1,300, and the production of Norway amounted to 57,485 pounds, valued at $5,643. The production of the Virginia rutile deposits, beginning in 1900, have amounted, up to date, to about 40,000 pounds, making an estimated output of rutile in the United States for the year 1901 of about 44,000 pounds.

GREAT LAKES ENGINEERING WORKS.

A company composed for the most part of gentlemen prominently identified with the foundry trade has been organized recently through the efforts of John R. Russel, the well known Detroit manufacturer. The new corporation is to be known as the Great Lakes Engineering Works, and on Saturday, May 31, it took over the plant and business of S. F. Hodge & Co., of Detroit, known for years as the Riverside Iron Works, one of the oldest of Detroit's manufacturing establishments. The negotiations were begun about three months ago, Mr. Russel, who is treasurer of the Russel Wheel & Foundry Co., having as his chief associates in the undertaking H. W. Hoyt, vice president of the Allis-Chalmers Co.; Antonio C. Pessano, vice president and general manager of the Geo. V. Cresson Co., of Philadelphia; Geo. H. Russel and John A. Penton. It is noteworthy that Messrs. Hoyt, Pessano, Penton and John R. Russel were the officers last year of the National Founders' Association, also that 15 years ago Mr. Penton was employed in the Hodge works as a molder.

At a meeting held May 31 the new company organized by electing the following officers: President and general manager, Antonio C. Pessano; vice president, H. W. Hoyt; secretary and treasurer, John R. Russel; directors, the foregoing with George H. Russel and John A. Penton. The capital stock remains the same as that of the Hodge company, $200,000. The business will be substantially that of the old company, the manufacture of marine and stationary engines, mining machinery, propeller wheels, and general jobbing foundry work. Orders which the new company has secured insures active operations for several months. Mr. Pessano has resigned as an officer of the Geo. V. Cresson Co. and disposed of his holdings, and will remove to Detroit.

The Hodge works were started in 1863, the original firm being Cowie, Hodge & Christie. In 1865 the firm became Hodge & Christie, and a few years later Samuel F. Hodge became sole proprietor. The present corporation dates back to 1883.

Some of the buildings of the present extensive plant which covers an area of 240x450 feet—having a frontage of 240 feet on Atwater street, in the immediate vicinity of the yards of the Grand Trunk system, and a depth of 450 feet to the river—were built in 1876. They were enlarged in 1889, and four years later increased business demanded still further additions and improvements. Aside from the excellent facilities for shipping by rail, the company, as its principal products, such as marine engines, shafts, propellers, etc., require, has a wharf 250 feet long, equipped with cranes and derricks for handling heavy vessel-propelling machinery. The main building is a brick structure, four stories high and 100 feet square. The foundry building is 84x160 feet, and the machine shop 84x150 feet. The Hodge works have furnished engines for some of the best known boats on the lakes. In its stationary engine output are included a number of pumping engines and engines for large lighting plants.

In addition to those named above the following are stockholders in the Great Lakes Engineering Works: H. S. Potter, Jr., vice president of the State Savings Bank; Walter S. Russel, vice president and general manager of the Russel Wheel & Foundry Co.; J. H. Avery, vice president of the Detroit, Belle Isle & Windsor Ferry Co., Detroit.

THE BLAST FURNACE STRIKE IN THE TWO VALLEYS.

Contrary to the general expectation of the trade, the strike of the valley blast furnace operatives scheduled for midnight of Saturday last proved to be a rather serious affair, as more than half the capacity of the two valleys was made idle. At most of the furnaces made idle the men left Sunday morning, June 1, after having attended to banking the furnaces. The engineers did not go out with the men, so that steam is being kept up and the furnaces are given as much air as they need to maintain the coke charge in good shape, while enough labor is being secured to renew the charge. There is little likelihood of any serious damage to any of the furnaces, and it is simply a loss of production, proportionate to the time the men stay out. Counting alternate stacks as one, there are 33 blast furnaces in the Mahoning and Shenango Valleys, 18 in the Shenango and 15 in the Mahoning Valley. Of these all are out except the Natonal Steel Co.'s furnaces and those of the Cherry Valley Iron Co. and Salem Iron Co. The position is as follows, with the rated annual capacity, which corresponds very closely with the actual rate of production:

Banked.	Yearly Capacity Gross Tons.
Shenango Valley:	
Fannie Furnace, Cherry Valley Iron Co.	45,000
Hall Furnace, Republic Iron & Steel Co.	45,000
Alice Furnace, Youngstown Iron Sheet & Tube Co.	68,000
Ella Furnace, Pickands, Mather & Co.	65,000
Sharpsville Furnace Co.	72,000
Shenango Furnace Co. (Three)	218,000
Stewart Iron Co.	82,000
Total banked in Shenanago Valley	595,000
Mahoning Valley:	
Anna Furnace, Struthers Furnace Co.	100,000
Grace Furnace, Brier Hill Iron & Coal Co.	125,000
Hannah and Haselton, Republic Iron & Steel Co.	190,000
Mattie Furnace, Girard Iron Co.	100,000
Tod Furnace, Youngstown Steel Co.	90,000
One Hubbard Furnace, Andrews & Hitchcock Iron Co.	75,000
Total banked in Mahoning Valley	680,000
In Operation.	
Shenango Valley:	
Seneca Furnace, Salem Iron Co.	90,000
Cherry Valley Iron Co., Salem	80,000
Four New Castle furnaces, National Steel Co.	580,000
One Sharon furnace, National Steel Co.	80,000
One furnace, Sharon Steel Co.	200,000
Total in operation in Shenango Valley	1,030,000
Mahoning Valley:	
Niles Furnace, National Steel Co.	90,000
Three Ohio furnaces, National Steel Co.	600,000
Total in operation in Mahoning Valley	690,000
Grand total banked	1,275,000
Grand total in operation	1,720,000
Atlantic Furnace, Mabel Furnace, Mary Furnace, Claire Furnace, and one Hubbard out for repairs.	440,000
Total capacity of the two valleys	3,435,000

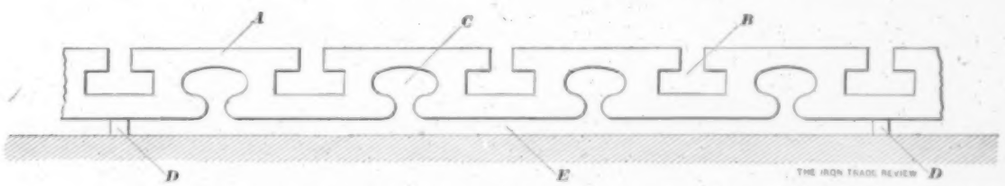
Thus there were in operation last week furnaces having a capacity of 2,995,000 tons a year, or some 8,000 tons a day; and of this capacity furnaces representing 3,500 tons daily production are banked, while two others, Claire and one Hubbard,

have gone out for repairs in view of the strike. As on May 1 the furnaces in blast in the country were producing 50,000 tons a day, the proportion put out is 8 percent. This would not be felt in ordinary times as it is felt now.

The organizers are making efforts to get out the men at Neville Island Furnace and Edith Furnace, of the American Steel & Wire Co., as well as the men at the Valley furnaces still in operation. The operators are arming deputies and making every effort to prevent any interference with the men they have at work. It is not regarded as probable that the strike will spread beyond the Valleys. Most of the furnaces now banked were running on Bessemer and basic iron, which was being shipped largely to United States Steel Corporation plants in Ohio and Pittsburg, so that while the corporation has not lost any of its own furnaces it is still seriously affected. A smaller proportion were running on forge and foundry iron. The loss of the forge production will affect the Republic Iron & Steel Co.

A DESIGN OF PLATES FOR TESTING FLOOR.

The testing floor of the Northern Electric Co.'s shop at Madison, Wis., is equipped with a peculiarly arranged system of cast iron floorplates. The floor has the service of a 20-ton crane traveling at right angles to the one in the main building and the two sets of runways overlap so that the one crane can easily reach and lift a machine deposited by the other. The testing department being at one side of the building and the shipping department at the other with railroad tracks entering the works, the machine is brought from the manufacturing end of the establishment to undergo the test and can then be at once transferred for shipment with no interference to the incoming machines.



END ELEVATION OF CAST IRON FLOOR, NORTHERN ELECTRIC CO., MADISON, WIS.

The ordinary testing floor is oftener an eyesore than otherwise. The arrangements for handling work are too frequently of a rough and ready construction and the whole outfit suggestive of the varied assortment of straps and bolts with which the workman tackles a jobbing shop planer practice. An outfit indeed of so elastic a nature that it will contract or stretch to the planer capacity. The floorplate is frequently unsightly for another reason; the plate is bolted in place and even if the holes are counterbored for the nuts and washers there is an open space which looks bad, and a projecting fastening is, of course, not to be considered if any alternative plan can be adopted.

Among a number of neat things that the superintendent, T. E. Drohan, has introduced during his management of the shops is a floorplate for the testing room which will at once attract the eye of the visitor interested in modern machine shop equipment. To all intents and purposes it has no visible means of attachment, and were it not for the very evident pull exerted by the belting, driving dynamos and other electrical machinery firmly bolted to the floorplates, it would certainly appear that sheer weight was the only retaining agency relied upon to secure the plates permanently in position.

The illustration tells the story. Here is an end elevation of a part of one of the plates. The plate being given the reference letter A and B is one of the T-solts in the upper side on which the machine for testing is placed. On the under side of the plate are a series of rounded openings C running parallel with the T-slots B. These cored passages, or inverted gutters, C not only lessen the weight of the casting but explain the method of holding down the plate.

Before the floorplates are placed in position the surface of the ground is thoroughly treated with gravel and grout between the beams. Strips D are then placed for the plate to rest upon and when the upper surface has been carefully leveled the cavity is filled with cement. This flows into the openings C and on cooling the plate is firmly attached to the foundation.

One of these plates was very thoroughly tested when the method was first adopted and it was found that the 20-ton crane could make no impression upon the plate and the solidity of the scheme is very satisfactory in the heavy work now besetting the manufacturer of electrical apparatus.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of their Wants:—

The E. R. Allen Foundry Co., of Corning, N. Y., was incorporated under the laws of New York May 26 for the purpose of doing general foundry business. The capital is $40,000. The company has purchased the plant and business of E. R. Allen and will do a general jobbing business in gray iron castings. It will also enlarge on a special line of agricultural implements made by E. R. Allen, namely, land rollers, potato diggers, etc. A new plant was erected last winter by E. R. Allen and has been in operation about five months. It is the expectation of the new company to enlarge the plant and put in some additional machinery a little later. The new plant covers about an acre of ground, and consists of the following buildings: Foundry, 60x80 feet; cleaning room and boiler room, 20x80 feet; machine shop, 36x80 feet; two story cupola room, 20x22 feet; besides core ovens, engine rooms, rattler room and office building. The plant has a capacity of about 25 tons a day and has been unable to take care of orders in the company's special lines. The directors are E. R. Allen, C. W. Allen, L. L. Flower, M. H. Fralic and H. E. Metcalf.

Chapman & Bangs Co., Bridgeport, Conn., has been incorporated with capital of $50,000, to manufacture metals and hardware. Incorporators: W. M. Bangs, W. T. Hincks and W. W. Chapman.

Ridgemont Cement Mfg. Co., 320 Walnut St., Philadelphia, is in the market for 60 feet of 4 7-16 shafting, with flange couplings; nine hangers or bearings for shaft; one 36x24-inch pulley, 4 7-16 bore, perforated face; one 30x14-inch pulley, same bore; one 48x14-inch pulley, 3 7-16 bore; one damper regulator, injector, 500 feet of 2-inch galvanized iron pipe, 6-inch exhaust head, valves, pipe fittings, belting, etc.

The Southern Sewer Pipe Co., Birmingham, Ala., is in the market for a belt power elevator.

A. J. Berger, 988 N. Talman Ave., Chicago, wants to buy a steel building 50 to 55 feet by 280 feet, or 80 to 85 feet by 280 to 300 feet, with crane track.

The Louisville Bolt & Iron Co., Louisville, Ky., has increased its capital stock from $150,000 to $350,000, and will erect a mill for the manufacture of sheets. Plans and specifications for the company's building have been completed and a site adjoining the present plant secured. The equipment will include two 300-horsepower engines, four waste-heat boilers, 26-inch muck mill, finishing mills, etc.

The Davis & Taylor Carriage Co., Richmond, Ind., has been incorporated with a capital stock of $30,000. The company has leased a building, which is to be remodeled and equipped with modern machinery.

The Daellenbach Gas Engine Co., Pittsburg, will be incorporated June 18, by Carl R. Daellenbach and others.

The United States Iron & Steel Co., Parkersburg, W. Va., is to be incorporated to erect a $150,000 rolling mill.

The Ohio Brass Co. has been chartered in New Jersey with

$1,000,000 capital stock by Frank B. Black and others of Mansfield, O.

New Construction:—

The Jackson Drop Forging Co.'s new plant on Axtel St., near Aetna St., Cleveland, will be 75x100 feet.

The Cleveland Crane & Car Co., of Cleveland, will occupy a portion of its new plant about July 1. The main building will be 165x100 feet, but it is laid out in sections and when fully completed will be 400 feet in length. A large electrical power house is being erected.

The Empire Iron & Sheet Co., Niles, O., is laying foundations for a 4-mill plant. Chas. Thomas and Wade A. Taylor are actively promoting the enterprise.

The Arkansas Southern Railway will rebuild at once the machine shops at Ruston, La., recently destroyed by fire.

Southern Engine & Boiler Co., Jackson, Tenn., has increased its capital stock from $75,000 to $200,000 for the purpose of making extensive improvements to its plant.

Illinois Central Railway will, it is reported, expend $500,000 in erecting shops at Memphis, Tenn., for rebuilding locomotives and cars.

The Lansing Wheelbarrow Co., Lansing, Mich., will erect a plant at Memphis, Tenn., for the manufacture of wheelbarrows, trucks, etc.

Lauer & Harper Co., Baltimore, Md., has purchased a site, 400x500 feet, for the erection of a structural iron and steel plant. The main shop will be 60x100 feet for bridge and building material; power house, 30x50; office building, 30x50. W. J. Lauer is president.

The Hollidaysburg (Pa.) Iron & Nail Co. has started erecting its new rolling mill building, 200x100 feet, which will be of wood and will contain several finishing trains. The old mill will be used as a puddling department.

The Baltimore Rolling Mill Co., Baltimore, Md., is having plans prepared for the construction of its plant, a 5-acre site having been secured. The main building will be 153x352. The plant is to have a 10-inch and 18-inch train at the start, for an annual output of 20,000 to 25,000 tons of bar iron. The company has a temporary office at 604 Continental Trust Building, Baltimore. Harry Wehr is president, Chas. G. Phillips, vice president and treasurer, and J. B. Bailey, secretary. Mr. Wehr is of the brokerage firm of H. Wehr & Co and Mr. Phillips was for many years associated with the Diamond State Steel Co.

The Southern Car & Foundry Co., Gadsden, Ala., has purchased the Coosa furnace, which it will rebuild, increasing its capacity to 60 tons. The company will manufacture charcoal iron for its own use.

The American Motor Carriage Co., of Cleveland, is planning the erection of a large steel structure. The work of manufacturing gasoline vehicles will proceed meantime in the present frame building.

Fires and Accidents:—

The plant of the Robinson Machine Co., at West Monongahela, Pa., was completely destroyed by fire last Thursday. The loss was $60,000, fully covered by insurance, and the plant will be rebuilt at once.

The nail mill at Sunbury, Pa., recently acquired and operated by the American Steel Co., is burned, entailing $50,000 loss, partly insured.

On May 28 the rod mill building and engine house and a quantity of valuable machinery of the Sharon Steel Co., Sharon, Pa., were destroyed by fire. The loss is between $40,000 and $50,000.

The Pittsburg District:—

The Scientific Materials Co., Pittsburg, has been chartered with $50,000 capital stock to manufacture, import and deal in laboratory apparatus and materials. George H. Clapp, of the Pittsburg Testing Laboratories, is president. Headquarters have been opened at 711 Penn Ave., Pittsburg.

The Colonial Steel Co., Colonia, Pa., started its rolling mill last week.

Rapid work is now being done on the tin plate plant being built at Port Vue, near McKeesport, Pa., by the McKeesport Mfg. Co. A hundred men have been at work five weeks excavating for foundations and putting in concrete piers. There will be 10 tin mills, housed in a building 65x350 feet, with a furnace lean-to 25x350 feet. The cold mill building will be 75x350 feet, and the tinhouse, assorting room and stock room combined 50x580 feet. The officials hope to have the plant running by the end of the year.

The extensive repairs to the Wood works, McKeesport, Pa., of the American Sheet Steel Co., are about completed, together with the two new mills, which will be started this month, making 27 mills at the works.

The Jas. C. Lindsay Hardware Co., Pittsburg, at a meeting of stockholders unanimously decided to increase the capital stock from $150,000 to $250,000.

The Carnegie Steel Co. is breaking ground this week for Carrie Furnace No. 5 at Rankin, Pa. The new furnace will be 95x20 feet, with a probable capacity of 400 tons of iron daily. Furnaces 1 and 2, which are the old Carrie furnaces, are making about 400 tons a day each, while Nos. 3 and 4, the new furnaces, are rated at between 600 and 700 tons. Furnace No. 5 will be designed for the smaller capacity largely because the ore yards and other facilities at the plant are not deemed adequate for another 700-ton furnace.

General Industrial Notes:—

The Garrett-Cromwell Engineering Co., of Cleveland, has the engineering work for the Alabama Steel & Wire Co.'s basic open-hearth steel plant at Ensley, Ala. There will be six 50-ton furnaces and a 36-inch blooming mill. Contracts are soon to be let for the power house, pumping plant, blooming mill, etc. The Garrett-Cromwell Engineering Co. also has the contract for the erection of the Detroit Iron & Steel Co.'s blast furnace at Delray, below Detroit, and the contract for two 25-ton open-hearth furnaces for the C. Pardee Works, of Perth Amboy, N. J.

In the past week the Bosworth-Holding Co., of Cleveland, made a shipment of five car loads of heavy machinery to Mexico City, to be used as part of the equipment of a blast furnace plant.

The American Brass Co., Hartford, Conn., has recently purchased the plant of the Mannesmann Cycle Tube Co., located a short distance from North Adams, Mass. The machinery has already been shipped to Waterbury, Conn., and will be installed at the company's plant at that place. The plant contained 16 large tube machines capable of producing steel, copper or brass tubing.

The annual meeting of the stockholders of the Virginia Iron, Coal & Coke Co., was held at Bristol, Va., last week. Officers for the ensuing year were elected as follows: Grant B. Schley, president; Henry K. McHarg, vice president; John W. Cure, treasurer.

The Carnegie Steel Co. will make a new departure in the erection of the two additional blast furnaces at Braddock, Pa. Instead of letting a bulk contract for the whole work, the company will erect the furnaces itself. It is believed that this will expedite the work. The first furnace is scheduled to be completed by January 1 next.

The Pennsylvania charter for the Jones & Laughlins Steel Co., Pittsburg, which is to succeed the limited partnership of Jones & Laughlins, Limited, was issued on Monday. The directors named are B. F. Jones, Jr., Willis L. King, William L. Jones, James B. Laughlin and Irvin B. Laughlin.

The Somerville Engineering Co., Pittsburg, has been formed by parties formerly connected with the American Bridge Co. The head of the new company is A. T. B. Somerville, formerly in charge of designing and estimating at Pittsburg. A. L. Schultz, who lately resigned as general manager of the American Bridge Co., will be consulting engineer.

The Youngstown (O.) Iron Sheet & Tube Co. last week started its sixth sheet mill, with rolls 52 inches long.

The Ashland (Ky.) Sheet Mill Co. expects to start two more sheet mills next week, making six in all. The galvanizing department will be ready about the same time.

The American Brass Co., Waterbury, Conn., has absorbed the Mannesman Cycle Tube Co., North Adams, Mass., and will remove the machinery to the Benedict & Burnham plant at Waterbury.

W. D. McKeefrey, trustee for creditors of the Continental Iron Co., has been given permission to operate the Wheatland plant for one year from July 1.